TARGA

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November 30, 2018

US EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, CO 80202

RE: True Minor Oil and Gas Source Registration – Part 2
Targa Badlands LLC
Robert's Trust Compressor Station
Fort Berthold Reservation, Dunn County, North Dakota

Targa Badlands LLC (Targa) currently owns and operates the Robert's Trust Compressor Station, a natural gas compressor station located within the exterior bounds of the Fort Berthold Indian Reservation in Dunn County, North Dakota.

The site is currently registered under Part 49 (initially registered in December 2012, with subsequent registrations submitted in June 2015 and November 2015). Note, each of these previously submitted tribal registration applications were submitted prior to October 3, 2016. As such, a Part 1 Registration application was submitted on August 9, 2017 for the proposed construction/modification at the facility. However, the construction associated with the 2017 submittal had not commenced prior to additional changes to the scope of the modification project. Per a conversation with US EPA Region 8, Targa completed and submitted a revision to the original Part 1 application in order to incorporate additional changes at the site. That application was submitted on June 21, 2018, 30 days prior to the start of the proposed construction/modification at the facility.

Targa is herein submitting the required Part 2 information to register the facility within 60 days from the commencement of operation for the proposed changes. The facility will be a true minor source and will continue to be a true minor source post these modifications (which will be classified as a minor modification)

Including the proposed changes from the original Part 1 application and the revised Part 1 application, Targa is proposing to incorporate the following changes at the facility:

- One (1) 1,050 gallon Methanol Tank;
- One (1) 400 barrel Produced Water Tank;
- Produced Water Loading Losses associated with the new Produced Water Tank;
- One (1) 400 barrel Condensate Tank;
- Condensate Loading Losses associated with the new Condensate Tank;
- One (1) Vapor Combustor;
- Fugitive Emissions associated with the new equipment;
- One (1) 0.675 MMBtu/hr Glycol Reboiler;
- One (1) 36 MMscfd Glycol Dehydrator;
- Six (6) Waukesha L5794GSI 1,380 hp Compressor Engines; and
- Updating the existing PIGGING emissions to reflect pigging operations for the new facility.
- Replacement of the existing vapor combustor with a larger model;
- Rerouting emissions from the existing produced water tanks from the atmosphere to the two vapor combustors;
- Addition of one (1) 507 hp generator engine; and
- Addition of two (2) 400 barrel condensate tanks.

Targa is also making the following changes/corrections to existing equipment at the Robert's Trust Compressor Station:

Correcting the maximum capacity of the existing dehydrator (EU 17/EPN 17) from 11 million standard cubic feet per day (MMscfd) to 12 MMscfd based on an updated engineering study. Replacing all pneumatic Pumps (EU 7/EPN 7) with air-assist pump. As such, these units will no longer have any emissions. Finally, Targa is also not installing the Vapor Combustor #2 (EU 23) from the original Part 1 application, dated August 9, 2017 and will be installing the larger Vapor Combustor from the revised Part 1 application. The original anticipated unit was never constructed so the same EU/EPN number was used.

With the aforementioned proposed changes, the Junction Compressor Station has the following units in operation:

- Nine compressor engines (EU 1, EU 2, EU 15, EU 27-32);
- Two glycol reboilers (EU 16 and EU 25);
- One tank heater (EU 5);
- Two glycol dehydrators (EU 17 and EU 25);
- Air Assisted Pneumatic Pumps (EU 7);
- Two methanol storage tank s(EU 8 and EU 18);
- Two produced water tanks (EU 9 and EU 19) and its associated loading losses (EU 10 and EU 20);
- Pig Receivers and Launchers (PIGGING);
- Fugitive emissions associated with equipment leak components (EU 14 and EU 24);
- Four condensate tanks (EU 11, EU 23, EU 33 and EU 34) and their associated loading losses (EU 12 and EU 22);
- Two generator engines (EU 3 and EU 35); and
- Two vapor combustors (EU 36 and EU 23);

We appreciate your assistance with this FIP Registration. If you have any questions or comments about the information presented in this letter, please do not hesitate to contact me at (405) 749-5614 or cschroder@targaresources.com.

Sincerely,
Targa Badlands LLC

Catherine Schroder
Senior Environmental Specialist

cc: Mr. Charles Bates, Targa Badlands LLC
Ms. Shelley Koehn, Trinity Consultants Inc.
Mr. Colin Schwartz
Ms. Claudia Smith

TRUE MINOR OIL AND GAS SOURCE REGISTRATION REVISION FEDERAL IMPLEMENTATION PLAN – PART 2

Targa Badlands LLC > Robert's Trust Compressor Station

TARGA

TARGA BADLANDS LLC

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November 2018

Project 172401.0033

Trinity Consultants

Environmental solutions delivered uncommonly well

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1. EXECUTIVE SUMMARY

Targa Badlands LLC (Targa) is herein submitting the required information to register additional units or modify units at the existing Robert's Trust Compressor Station (also referred to herein as the "facility") under the Federal Implementation Plan (FIP) for True Minor Oil and Gas Sources per the requirements of Title 40 of the Code of Federal Regulations (40 CFR) Part 49. The facility is located at latitude 47.63229° North and Longitude 102.60386° West in Dunn County, North Dakota within the exterior bounds of the Fort Berthold Indian Reservation. The site is used to compress and dehydrate natural gas from nearby wells (SIC 1311, NAICS 211111).

Under §49.152(d), true minor sources means a source, not including the exempt emission units and activities listed in §49.153(c), that emits, or has the potential to emit, regulated New Source Review (NSR) pollutants in amounts that are less than the major source thresholds in §49.167 or §52.21, as applicable, but equal to or greater than the minor NSR thresholds in §49.153, without the need to take an enforceable restriction to reduce its potential to emit to such levels. The facility will be a true minor source and will continue to be a true minor source post these modifications which will be classified as a minor modification).

The site is currently registered under Part 49 (initially registered in December 2012, with subsequent registrations submitted in June 2015 and November 2015). Note, each of these previously submitted tribal registration applications were submitted prior to October 3, 2016. As such, a Part 1 Registration application was submitted on August 9, 2017 for the proposed construction/modification at the facility. However, the construction associated with the 2017 submittal had not commenced prior to additional changes to the scope of the modification project. Per a conversation with US EPA Region 8, Targa completed and submitted a revision to the original Part 1 application in order to incorporate additional changes at the site. That application was submitted on June 21, 2018, 30 days prior to the start of the proposed construction/modification at the facility. This Part 2 application satisfies the requirement to submit the Part 2 information within 60 days from startup of production/commencement of operation. Appendix A includes the Part 2 application form, Appendix B includes the potential to emit calculations for the site, and Appendix C includes vendor specification sheets.

Including the proposed changes from the original Part 1 application and the revised Part 1 application, Targa is proposing to incorporate the following changes at the facility:

- One (1) 1,050 gallon Methanol Tank;
- One (1) 400 barrel Produced Water Tank;
- Produced Water Loading Losses associated with the new Produced Water Tank;
- One (1) 400 barrel Condensate Tank;
- Condensate Loading Losses associated with the new Condensate Tank;
- One (1) Vapor Combustor;
- Fugitive Emissions associated with the new equipment;
- One (1) 0.675 MMBtu/hr Glycol Reboiler;
- One (1) 36 MMscfd Glycol Dehydrator;
- Six (6) Waukesha L5794GSI 1,380 hp Compressor Engines; and
- Updating the existing PIGGING emissions to reflect pigging operations for the new facility.
- Replacement of the existing vapor combustor with a larger model;
- Rerouting emissions from the existing produced water tanksfrom the atmosphere to the two vapor combustors
- Addition of one (1) 507 hp generator engine; and
- Addition of two (2) 400 barrel condensate tanks.

Targa is also making the following changes/corrections to existing equipment at the Robert's Trust Compressor Station:

Correcting the maximum capacity of the existing dehydrator (EU 17/EPN 17) from 11 million standard cubic feet per day (MMscfd) to 12 MMscfd based on an updated engineering study. Replacing all pneumatic Pumps (EU 7/EPN 7) with air-assist pump. As such, these units will no longer have any emissions. Finally, Targa is also not installing the original Part 1 application Vapor Combustor #2 (EU 23) and will be installing the larger Vapor Combustor from the revised Part 1 application. The original anticipated unit was never constructed so the same EU/EPN number was used.

1.1. GENERAL APPLICANT INFORMATION

Listed below are the points of contact for the Robert's Trust Compressor Station registration application. This information is also provided in the application form provided in Appendix A.

Project Site: Targa Badlands LLC – Robert's Trust Compressor Station
S/2, SW/4, S13, T148N, R94W
Dunn County, North Dakota

Applicant Contact: Catherine Schroder
Senior Environmental Specialist
Targa Badlands LLC
14000 Quail Springs Parkway Suite 215
Oklahoma City, Oklahoma 73134
(405) 749-5614

1.2. LOCATION MAP

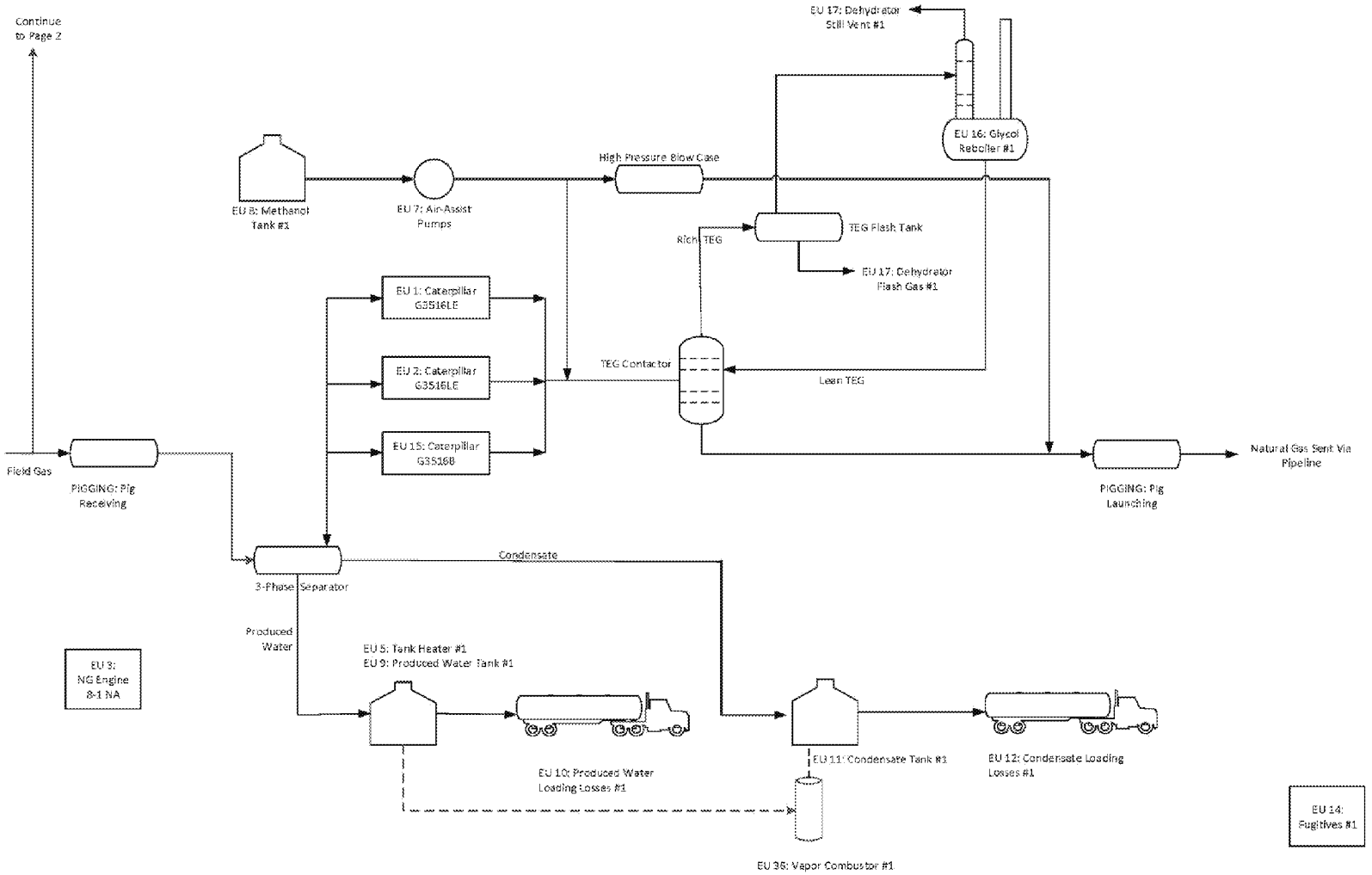
Figure 1-1. Robert's Trust Compressor Station Location Map

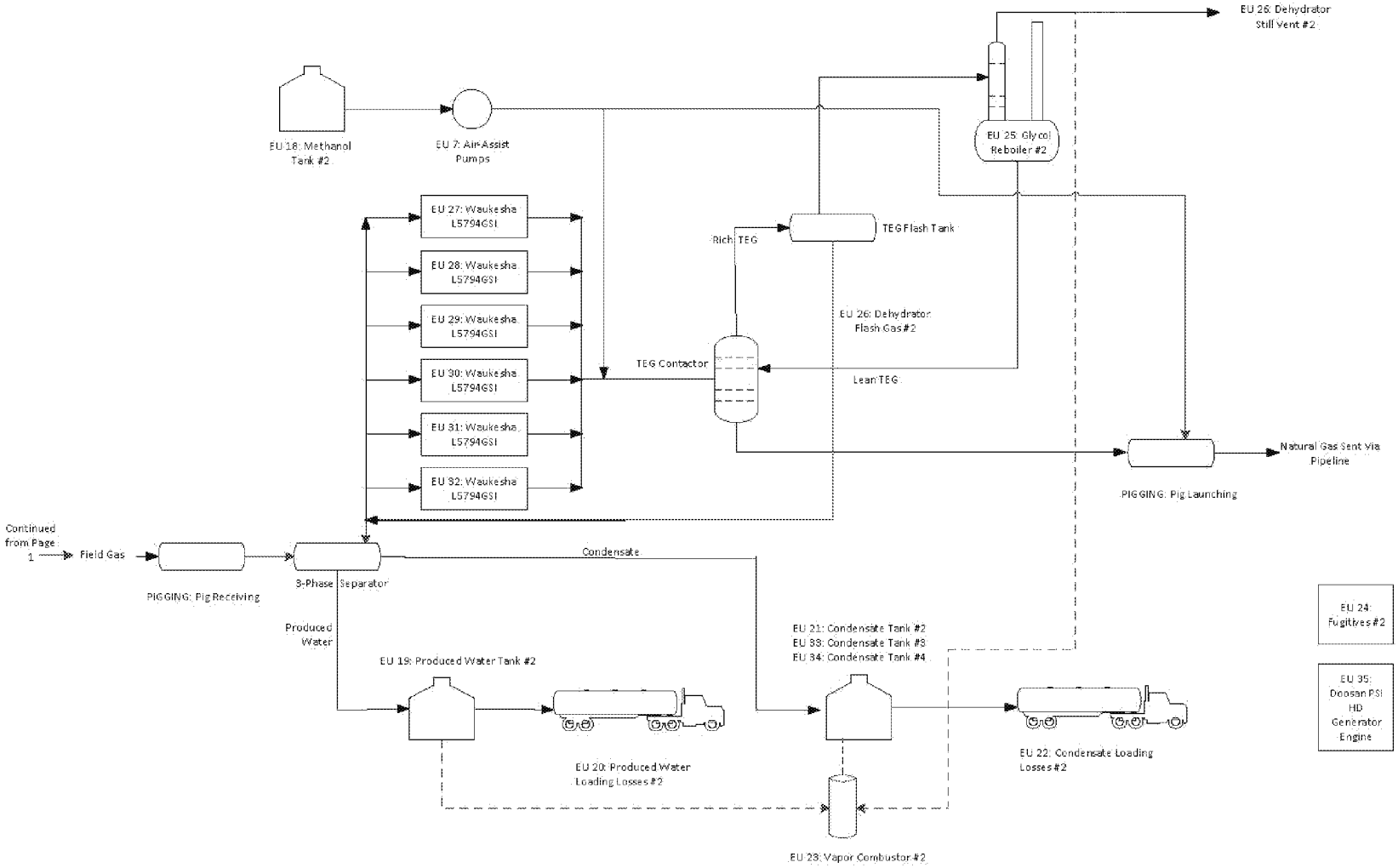
S/2, SW/4, S13, T148N, R94W
Dunn County, ND

2.1. DESCRIPTION OF OPERATIONS

The process described will occur at both the existing Robert's Trust Compressor Station, as well as the additional site located across the street. The inlet gas flows from gas lines through a Pipe Inspection Gauge (PIG) to a 3-phase separator, where liquids are gravimetrically separated. Produced water and condensate are directed to the produced water and condensate tanks, respectively, and are trucked from the facility. The condensate tanks and produced water tanks are controlled by vapor combustors. The overhead gas is compressed and dehydrated before being discharged to the gathering pipeline. The rich glycol is first directed to a flash tank to remove entrained hydrocarbons before being sent to the glycol reboiler. The glycol reboiler vapor stream is directed to the atmosphere. Methanol is injected at different points in the process using air-assisted pneumatic pumps to prevent hydrates from forming. A process flow diagram is presented in Section 2-2.

2.2. PROCESS FLOW DIAGRAM




EU 26: Dehydrator Still Vent #2
EU 18: Methanol Tank #2
EU 7: Air-Assist Pumps
EU 25: Glycol Reboiler #2
EU 27: Waukesha L5794GSI
EU 28: Waukesha L5794GSI
EU 29: Waukesha L5794GSI
EU 30: Waukesha L5794GSI
EU 31: Waukesha L5794GSI
EU 32: Waukesha L5794GSI
Rich TEG
TEG Flash Tank
EU 26: Dehydrator Flash Gas #2
TEG Contactor
Lean TEG
Natural Gas Sent Via Pipeline
PIGGING: Pig Launching
Continued from Page: 1
Field Gas
PIGGING: Pig Receiving
3-Phase Separator
Condensate
Produced Water
EU 19: Produced Water Tank #2
EU 21: Condensate Tank #2
EU 33: Condensate Tank #3
EU 34: Condensate Tank #4
EU 20: Produced Water Loading Losses #2
EU 22: Condensate Loading Losses #2
EU 23: Vapor Combustor #2
EU 24: Fugitives #2
EU 35: Doosan P5I HD Generator Engine

2.3. IDENTIFICATION OF EMISSION UNITS

A complete list of the emission units present at the site can be found in Table 2-1. Table 2-1 includes the Emission Unit ID (EU) and Emission Point Number (EPN) for each unit at the site, as well as equipment descriptions and a brief note describing the changes to each emission unit in this Part 49 Registration application where applicable.

Table 2-1. Emission Unit Summary

Emission Unit ID	Emission Point ID	Description	Capacity/Rating	Notes
1	1	Caterpillar G3516LE	1,340 hp	-
2	2	Caterpillar G3516LE	1,340 hp	-
3	3	NG Engine 8.1 NA	118 hp	-
5	5	Tank Heater #1	0.5 MMBtu/hr	-
7	7	Air-Assist Pneumatic Pumps	-	-
8	8	Methanol Storage Tank #1	1,050 gal	-
9	36	Produced Water Tank #1	400 bbl	-
10	10	Produced Water Loading Losses #1	7,300 bbl/yr	-
11	36	Condensate Tank #1	400 bbl	-
12	12	Condensate Loading Losses #1	28,470 bbl/yr	-
13	13	Vapor Combustor #1	-	Replaced with EU 35
14	14	Fugitive Emissions #1	-	-
15	15	Caterpillar G3516B	1,380 hp	-
16	16	Glycol Reboiler #1	0.25 MMBtu/hr	-
17	17	Dehy Process Vents #1	12 MMscfd	-
18	18	Methanol Storage Tank #2	1,050 gal	-
19	23	Produced Water Tank #2	400 bbl	-
20	20	Produced Water Loading Losses #2	TBD	-
21	23	Condensate Tank #2	400 bbl	-
22	22	Condensate Loading Losses #2	TBD	-
23	23	Vapor Combustor #2	-	Larger unit to be installed than initially listed in original Part 1
24	24	Fugitive Emissions #2	-	-
25	25	Glycol Reboiler #2	0.675 MMBtu/hr	-
26	26	Dehy Process Vents #2	36 MMscfd	-
27	27	Waukesha L5794GSI	1,380 hp	-
28	28	Waukesha L5794GSI	1,380 hp	-
29	29	Waukesha L5794GSI	1,380 hp	-
30	30	Waukesha L5794GSI	1,380 hp	-
31	31	Waukesha L5794GSI	1,380 hp	-
32	32	Waukesha L5794GSI	1,380 hp	-
PIGGING	PIGGING	Pig Launching / Receiving	-	-
33	23	Condensate Tank #3	400 bbl	New Unit
34	23	Condensate Tank #4	400 bbl	New Unit
35	35	Doosan PSI HD Generator Engine	507 hp	New Unit
36	36	Vapor Combustor #1	-	Replacing EU 13

2.4. AIR POLLUTION CONTROL

Table 2-2 lists the control devices currently installed, or that Targa will install as part of this project, at the Robert's Trust Compressor Station. This table also lists the federal regulation requiring the control equipment, such as New Source Performance Standards (NSPS) found in 40 CFR Part 60 or National Emission Standards for Hazardous Air Pollutants (NESHAP) found in 40 CFR Part 63. All other equipment onsite is uncontrolled.

Table 2-2. List of Controlled Emission Units

Emission Unit ID	Emission Point ID	Description	Controls	Control Requirement
1	1	Caterpillar G3216LE	NSCR	NESHAP ZZZZ within 3 years of becoming a Major Source of HAP
2	2	Caterpillar G3216LE	NSCR	NESHAP ZZZZ within 3 years of becoming a Major Source of HAP
3	3	NG Engine 8.1 NA	Certified Engine	NSPS JJJJ/NESHAP ZZZZ
9	36	Produced Water Tank #1	Vapor Combustor #1 (EU 36)	N/A (Not Subject to NSPS OOOO/OOOOa as PTE < 6 tpy). No controls are claimed in calculating emissions for this unit.
11	36	Condensate Tank #1	Vapor Combustor #1 (EU 36)	NSPS OOOO
15	15	Caterpillar G3516B	Oxidation Catalyst	NSPS JJJJ/NESHAP ZZZZ within years of becoming a Major Source of HAP
19	23	Produced Water Tank #2	Vapor Combustor #2 (EU 23)	N/A (Not Subject to NSPS OOOO/OOOOa as PTE < 6 tpy). No controls are claimed in calculating emissions for this unit.
21	23	Condensate Tank #2	Vapor Combustor #2 (EU 23)	NSPS OOOOa
27	27	Waukesha L5794GSI	NSCR	NSPS JJJJ/NESHAP ZZZZ
28	28	Waukesha L5794GSI	NSCR	NSPS JJJJ/NESHAP ZZZZ
29	29	Waukesha L5794GSI	NSCR	NSPS JJJJ/NESHAP ZZZZ
30	30	Waukesha L5794GSI	NSCR	NSPS JJJJ/NESHAP ZZZZ
31	31	Waukesha L5794GSI	NSCR	NSPS JJJJ/NESHAP ZZZZ
32	32	Waukesha L5794GSI	NSCR	NSPS JJJJ/NESHAP ZZZZ
33	23	Condensate Tank #3	Vapor Combustor #2 (EU 23)	NSPS OOOOa
34	23	Condensate Tank #4	Vapor Combustor #2 (EU 23)	NSPS OOOOa
35	35	Doosan PSI HD Generator Engine	Certified Engine/NSCR	NSPS JJJJ/NESHAP ZZZZ

Targa will include a detailed regulatory review for each unit in the Part 2 application.

2.5. COMPLIANCE MONITORING DEVICES/ACTIVITIES

In order to demonstrate compliance with applicable FIP requirements, Targa will perform applicable monitoring and testing per applicable NSPS and/or NESHAP regulations contained in the FIP. For sources that are not subject to any monitoring and testing requirements in the NSPS and/or NESHAP regulations, Targa will utilize industry best management practices and will maintain and operate site equipment per manufacturer recommendations to minimize air emissions.

3.1. EXPECTED ACTUAL OPERATING SCHEDULE

Targa anticipates the facility will operate 24 hours per day, 7 days per week, and 52 weeks per year (8,760 hours per year). Operation of the new equipment began on October 31, 2018[1]. Targa has conservatively assumed that the actual emissions for the facility are equal to the potential to emit for the facility.

3.2. EMISSION CALCULATION METHODOLOGY

This section addresses the basis for the emission calculations for each emission unit at the facility. The pollutant that are evaluated for the emission units include nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), sulfur dioxide (SO_2), particulate matter with an aerodynamic diameter of less than 10 microns (PM_{10}), particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$), and hazardous air pollutants (HAPs). Each emission unit description also includes a unit identification also includes a unit identification number for cross-referencing with the attached emission calculation worksheets included in Appendix B. Tables 3-1 and 3-2 include the potential to emit summary for criteria pollutants and hazardous air pollutants, respectively.

Targa has grouped similar emission units together for simplicity, and has outlined emission for the following emission units and groups.

- Natural Gas-Fired Reciprocating Internal Compression Engines;
- Storage Tanks;
- Loading Losses;
- Pigging Operations;
- Fugitive Emissions;
- Glycol Dehydrator;
- Natural-Gas Fired Heaters; and
- Vapor Combustor

[1] Per 10/31/2018 email with Catherine Schroder of Targa Resources

Table 3-1 Potential to Emit – Criteria Pollutants

EU	EPN	Equipment Description	Design Rating	Criteria Pollutant Emissions (tpy)					
				NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Existing Equipment									
1	1	Caterpillar G3516LE	1,340 hp	25.88	23.68	7.12	0.03	0.49	0.49
2	2	Caterpillar G3516LE	1,340 hp	25.88	23.68	7.12	0.03	0.49	0.49
3	3	NG Engine 8.1 NA	118 hp	1.14	2.28	0.89	<0.01	0.09	0.09
5	5	Tank Heater #1	0.5 MMBtu/hr	0.15	0.13	<0.01	<0.01	0.01	0.01
7	7	Pneumatic Pumps [1]	--	--	--	--	--	--	--
8	8	Methanol Storage Tank #1	1,050 gallons	--	--	0.02	--	--	--
9	36	Produced Water Tank #1 [2]	400 bbl	--	--	--	--	--	--
10	10	Produced Water Loading Losses #1	7,300 bbl/yr	--	--	0.12	--	--	--
11	36	Condensate Tank #1 [2]	400 bbl	--	--	--	--	--	--
12	12	Condensate Loading Losses #1	28,470 bbl/yr	--	--	8.37	--	--	--
13	13	Vapor Combustor #1 - REMOVED	--	--	--	--	--	--	--
14	FUG	Fugitive Emissions #1	--	--	--	10.72	--	--	--
15	15	Caterpillar G3516B	1,380 hp	6.66	26.65	14.39	0.03	0.49	0.49
16	16	Glycol Reboiler #1	0.25 MMBtu/hr	0.08	0.06	<0.01	<0.01	<0.01	<0.01
17	17	Dehy Process Vents #1	12 MMscfd	--	--	27.12	--	--	--
Existing Equipment Total				*59.79*	*76.48*	*75.87*	*0.09*	*1.57*	*1.57*
Proposed Equipment									
18	18	Methanol Storage Tank #2	1,050 gallons	--	--	0.02	--	--	--
19	23	Produced Water Tank #2 [3]	400 bbl	--	--	--	--	--	--
20	20	Produced Water Loading Losses #2	7,300 bbl/yr	--	--	0.12	--	--	--
21	23	Condensate Tank #2 [3]	400 bbl	--	--	--	--	--	--
22	22	Condensate Loading Losses #2	28,470 bbl/yr	--	--	25.11	--	--	--
23	23	Vapor Combustor #2	--	0.11	0.50	2.47	<0.01	--	--
24	FUG	Fugitive Emissions #2	--	--	--	13.63	--	--	--
25	25	Glycol Reboiler #2	0.675 MMBtu/hr	0.21	0.17	0.01	<0.01	0.02	0.02
26	26	Dehy Process Vents #2	36 MMscfd	--	--	25.44	--	--	--
27	27	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
28	28	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
29	29	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
30	30	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90

EU	EPN	Equipment Description	Design Rating	Criteria Pollutant Emissions (tpy)					
				NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
31	31	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
32	32	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
PIGGING	PIGGING	Pig Launching / Receiving	--	--	--	17.32	--	--	--
33	23	Condensate Tank #3 [3]	400 bbl	--	--	--	--	--	--
34	23	Condensate Tank #4 [3]	400 bbl	--	--	--	--	--	--
35	35	Doosan PSI HD Generator Engine	507 hp	4.90	9.79	3.91	0.01	0.46	0.46
36	36	Vapor Combustor #1 - NEW	-	0.06	0.29	0.99	<0.01	--	--
Proposed Equipment Total				*85.23*	*170.66*	*148.98*	*0.18*	*5.86*	*5.86*
Facility Total				**145.02**	**247.14**	**224.85**	**0.27**	**7.43**	**7.43**
PSD Total [4]				**145.02**	**247.14**	**200.50**	**0.27**	**7.43**	**7.43**

1. Pneumatic pumps were replaced with air-assist pumps per August 2017 Part 1 Tribal Registration submittal, thus there are no emissions for EU 7.
2. Emissions from EU 11 (Condensate Tank #1) and EU 9 (Produced Water Tank #1) are routed through EU 36 (Vapor Combustor #1), and are thus included in the vapor combustor emission totals.
3. Emissions from EU 21, EU 33, 34 (Condensate Tank #2, #3, #4) and EU 19 (Produced Water Tank #2) are routed through EU 23 (Vapor Combustor #2), and are thus included in the vapor combustor emission totals.
4. PSD Total excludes fugitive emissions.

Table 3-2 Potential to Emit – Hazardous Air Pollutants

EU	EPN	Equipment Description	Design Rating	HAP Emissions (tpy)										
				2,2,4-TMP	Acetalde-hyde	Acrolein	Benzene	Ethyl-Benzene	CH_2O	Methanol	n-Hexane	Toluene	Xylenes	Total HAP
Existing Equipment														
1	1	Caterpillar G3516LE	1,340 hp	0.01	0.50	0.31	0.03	<0.01	3.23	0.15	0.07	0.02	0.01	4.39
2	2	Caterpillar G3516LE	1,340 hp	0.01	0.50	0.31	0.03	<0.01	3.23	0.15	0.07	0.02	0.01	4.39
3	3	NG Engine 8.1 NA	118 hp	--	0.01	0.01	<0.01	<0.01	0.09	0.01	--	<0.01	<0.01	0.14
5	5	Tank Heater #1	0.5 MMBtu/hr	--	--	--	<0.01	--	<0.01	--	<0.01	<0.01	--	<0.01
7	7	Pneumatic Pumps 1	--	--	--	--	--	--	--	--	--	--	--	--
8	8	Methanol Storage Tank #1	1,050 gallons	--	--	--	--	--	--	0.02	--	--	--	0.02
9	36	Produced Water Tank #1 [2]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
10	10	Produced Water Loading Losses #1	7,300 bbl/yr	<0.01	--	--	<0.01	<0.01	--	--	<0.01	<0.01	<0.01	<0.01
11	36	Condensate Tank #1 [2]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
12	12	Condensate Loading Losses #1	28,470 bbl/yr	0.02	--	--	0.01	<0.01	--	--	0.31	0.01	<0.01	0.36
13	13	Vapor Combustor #1 - REMOVED	--	--	--	--	--	--	--	--	--	--	--	--
14	FUG	Fugitive Emissions #1	--	0.10	--	--	0.03	0.03	--	0.96	0.30	0.06	0.09	1.56
15	15	Caterpillar G3516B	1,380 hp	0.04	1.20	0.74	0.06	<0.01	1.53	0.36	0.16	0.06	0.03	7.84
16	16	Glycol Reboiler #1	0.25 MMBtu/hr	--	--	--	<0.01	--	<0.01	--	<0.01	<0.01	--	<0.01
17	17	Dehy Process Vents #1	12 MMscfd	0.02	--	--	0.89	--	--	--	0.24	0.30	--	1.45

EU	EPN	Equipment Description	Design Rating	HAP Emissions (tpy)										
				2,2,4-TMP	Acetalde-hyde	Acrolein	Benzene	Ethyl-Benzene	CH_2O	Methanol	n-Hexane	Toluene	Xylenes	Total HAP
Existing Equipment Total				*0.20*	*2.20*	*1.36*	*1.05*	*0.04*	*8.09*	*1.64*	*1.16*	*0.48*	*0.15*	*20.16*
Proposed Equipment														
18	18	Methanol Storage Tank #2	1,050 gallons	--	--	--	--	--	--	0.02	--	--	--	0.02
19	23	Produced Water Tank #2 [3]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
20	20	Produced Water Loading Losses #2	7,300 bbl/yr	<0.01	--	--	<0.01	<0.01	--	--	<0.01	<0.01	<0.01	<0.01
21	23	Condensate Tank #2 [3]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
22	22	Condensate Loading Losses #2	28,470 bbl/yr	0.05	--	--	0.04	<0.01	--	--	0.94	0.04	<0.01	1.08
23	23	Vapor Combustor #2	--	<0.01	--	--	<0.01	<0.01	--	--	0.07	<0.01	<0.01	0.08
24	FUG	Fugitive Emissions #2	--	0.14	--	--	0.05	0.04	--	0.96	0.55	0.11	0.12	1.97
25	25	Glycol Reboiler #2	0.675 MMBtu/hr	--	--	--	<0.01	--	<0.01	--	<0.01	<0.01	--	<0.01
26	26	Dehy Process Vents #2	36 MMscfd	0.02	--	--	0.84	--	--	--	0.22	0.28	--	1.35
27	27	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
28	28	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
29	29	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
30	30	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
31	31	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
32	32	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
PIG-GING	PIG-GING	Pig Launching / Receiving	--	0.06	--	--	0.02	<0.01	--	--	0.28	0.02	0.02	0.40
33	23	Condensate Tank #3 [3]	400 bbl	--	--	--	--	--	--	--	--	--	--	--

EU	EPN	Equipment Description	Design Rating	HAP Emissions (tpy)										
				2,2,4-TMP	Acetaldehyde	Acrolein	Benzene	Ethyl-Benzene	CH_2O	Methanol	n-Hexane	Toluene	Xylenes	Total HAP
34	23	Condensate Tank #4 [3]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
35	35	Doosan PSI HD Generator Engine	507 hp	--	0.07	0.06	0.04	<0.01	0.49	0.07	--	0.01	<0.01	0.77
36	36	Vapor Combustor #1 - NEW	-	<0.01	--	--	<0.01	<0.01	--	--	0.03	<0.01	<0.01	0.03
Proposed Equipment Total				*0.26*	*0.84*	*0.79*	*1.43*	*0.06*	*4.49*	*1.89*	*2.09*	*0.62*	*0.21*	*13.00*
Facility Total				**0.46**	**3.04**	**2.15**	**2.49**	**0.10**	**12.58**	**3.53**	**3.25**	**1.10**	**0.35**	**33.16**

1. Pneumatic pumps were replaced with air-assist pumps per August 2017 Part 1 Tribal Registration submittal, thus there are no emissions for EU 7.
2. Emissions from EU 11 (Condensate Tank #1) and EU 9 (Produced Water Tank #1) are routed through EU 36 (Vapor Combustor #1), and are thus included in the vapor combustor emission totals.
3. Emissions from EU 21, EU 33, 34 (Condensate Tank #2, #3, #4) and EU 19 (Produced Water Tank #2) are routed through EU 23 (Vapor Combustor #2), and are thus included in the vapor combustor emission totals.

3.2.1. Natural Gas-Fired Reciprocating Internal Compression Engines

There are eleven (11) natural gas-fired engines at the facility – EU 1, 2, 3, 15, 27, 28, 29, 30, 31, 32, and 35. The facility uses EU 1, 2, 15, and 27-32 to compress natural gas, and EU 3 and 35 for power generation. EU 1, 2, and 15 are four-stroke lean burn (4SLB) engines. EU 3, 27-32, and 35 are all four-stroke rich burn (4SRB) engines.

Engines EU 1 and 2 are Caterpillar G3516LE model engines. As noted in Section 4.3.3, these two engines are not subject to NSPS JJJJ. As such emission factors for NOx, CO, VOC, formaldehyde, and methane were from manufacturer specifications. All other emission factors were used from AP-42 Chapter 3.2[2].

Federally enforceable emissions limits from NSPS JJJJ were used as emission factors for NOx, CO, and VOC for EU 3, 27-32, and 35. EU 15 only used the NSPS JJJJ limits for CO and VOC, as the manufacturer's specification for NOx was less than the limit. All other emission factors, minus formaldehyde, were taken from AP-42 Chapter 3.2. Section 4.3.3 goes into detail on why these engines are subject to NSPS JJJJ limits.

The manufacturer's specification for formaldehyde emissions was used for all engines, except for EU 3 which used AP-42 Chapter 3.2. As the VOC limit in NSPS JJJJ does not include formaldehyde, Targa combined the VOC emission factor from NSPS JJJJ and the manufacturer's emission factor for formaldehyde to calculate total VOC emissions. For EU 1 and 2 Targa combined the manufacturer's specification for both VOC and formaldehyde.

Both potential and actual emissions assumed 8.760 hours of operation.

3.2.2. Storage Tanks

The facility includes the following storage tanks: two (2) produced water tanks, four (4) condensate tanks, and two (2) methanol tanks.

The produced water (EU 9, EU 19) and condensate (EU 11, EU 21, EU 33-34) tanks will have working, breathing, and flash emissions. Targa used ProMax 4.0 to predict emission from both the produced water and condensate tanks. The program uses the Peng-Robinson equation of state to predict flashing emissions and the equations of AP-42 Section 7.1[3] to predict working and standing losses. The ProMax file assumes 1% of the condensate is sent to the produced water tank. The flash emissions are calculated by using a representative sample of condensate off the bottom of the scrubber before dumping into the atmospheric tank at the facility. ProMax is run using this sample and dropping the pressure to atmospheric pressure. Annual average temperature from meteorological data in TANKS is used and conservatively estimates annual emission. The output file from the ProMax run can be found in Appendix B.

Emissions from the methanol tanks (EU 8, EU 18) were calculated using the EPA TANKS 4.09d program, which uses the equations of AP-42 Chapter 7.1.

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[2] Natural Gas-Fired Reciprocating Engines, Table 3.2-3 (7/00)

[3] Organic Liquid Storage Tanks (11/06)

3.2.3. Loading Losses

Loading losses for the produced water (EU 10, EU 20) and condensate (EU 12, EU 22) being loaded into tank trucks were calculated using equations from AP-42 Section 5.2[4]. Variables for the equitation including molecular weight, vapor pressure, and vapor content were taken from the ProMax vapor phase of the condensate tank. Note that the composition of the produce water loaded was assumed to be 1% condensate.

3.2.4. Pigging Operations

Each time a PIG is received or launched at the facility, the PIG trap must be depressurized to atmosphere in order to remove the PIG from or insert the PIG into the pipeline. VOC and HAP emissions will occur from each depressurization event. The operating conditions and dimensions of each receiver were used to calculate the volume of gas vented during each depressurization event. The operating conditions and dimensions of each receiver were used to calculate the volume of gas vented during each depressurization event. Emissions were calculated based on the depressurization volume, gas composition, and number of depressurization events. Emissions were based on four pig launchers and eight pig receivers purged per day. Since the launchers and receivers are of varying size and pressure, emissions were calculated using the worst-case gas volume purged for pig launching and receiving.

3.2.5. Fugitive Emissions

Fugitive component leak emissions (EU 14, EU 24) were calculated based on the emission factors in Table 2-4 of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). Components in each service were updated based on component counts from a similar facility. Stream compositions were taken from site-specific condensate and field gas analyses. Both actual and PTE emission assume 8,760 hours of operation.

3.2.6. Glycol Dehydrator

One 12 MMscfd and one 36 MMscfd triethylene glycol (TEG) dehydrator (EU 17 and EU 26, respectively) are used to remove water from natural gas. VOC and HAP emissions from the units were calculated using GRI-GLYCalc v4.0. Inputs to the model are based on the extended site-specific gas analysis taken upstream of the dehydrator, using the maximum gas throughput, the optimal glycol pump rate, and the operating conditions of the dehydrator(s). The output file from the GRI-GLYCalc runs can be found in Appendix B

3.2.7. Natural Gas-Fired Heater

There are two natural gas-fired glycol reboilers (EU 16 and EU 25) and one tank heater (EU 5) located at the facility. Emission from these heaters were calculated based on each unit's maximum heat input and the emission factors listed in AP-42 Section 1.4[5]

3.2.8. Vapor Combustor

There are two vapor combustors (EU 36 and EU 23) at the facility, which are used to control emissions from the produced water (EU 9, EU 19) and condensate (EU 11, EU 21, EU 33-34) tanks. Each vapor combustor has a 98% control efficiency; however a 95% control efficiency is clamed on each condensate tank as required by §60, Subpart OOOO and OOOOa. In addition, a natural gas-fired pilot is associated with the vapor combustor, and also

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[4] Transportation and Marketing of Petroleum Liquids (7/08)

[5] Natural Gas Combustion (7/98)

contributes to emissions. Note that the vapor combustor is not mandated to be operated for the produced water tanks by either NSPS OOOO or NSPS OOOOa, therefore no control efficiency is claimed when determining potential emissions from the produced water tanks.

VOC and HAP emission from the vapor combustor were calculated by calculating the uncontrolled emissions from the condensate tanks and applying a 95% control efficiency[6]. The pilot VOC and HAP emissions were calculated using a speciated fuel gas analysis, pilot gas flowrate, and heat content. Formaldehyde emissions were calculated separately for both the condensate vapor and the pilot gas combustion by using emission factors from AP-42 Section 1.4 and flowrate of both the vapor in the tanks as well as the flowrate of the pilot gas. CO and NO_x emissions were also calculated for the vapor combustor using emission factors from AP-42 Section 13.5[7]. SO_2 emissions were calculated for the pilot by applying a flare efficiency fraction and fuel sulfur content to the total pilot fuel that was burned.

[6] Note that the uncontrolled emission of the produced water tank were also included, but no control efficiency was applied.

[7] Industrial Flares (2/18).

As requested on the Part 2 application form, Targa has competed a regulatory applicability review of each emission unit at the facility, including the following potentially applicable regulations, standards, and provisions:

- Minor Source new Source Review (NSR) and Prevention of Significant Deterioration (PSD);
- Federal Title V Operating Permit Program (Title V) and Compliance Assurance Monitoring (CAM);
- New Source Performance Standards (NSPS) in 40 CFR Part 60; and
- National Emission Standards for Hazardous Air Pollutants (NESHAP) in 40 CFR Part 63.

The federal regulatory programs, as promulgated by the United States Environmental Protection Agency (U.S. EPA), and administered by Region 8 have been developed under the authority of the 1970 Clean Air Act (or ACT) and subsequent amendments.

4.1. MINOR SOURCE NEW SOURCE REVIEW (NSR) AND PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

The FIP for True Minor Oil and Gas Sources requires that oil and gas sources that are considered true minor sources under the Prevention of Significant Deterioration (PSD) program must register as a minor source with the EPA. The FIP applies to new and modified true minor sources that are located or expanding in the referenced areas of Indian country designated as attainment, unclassifiable, or attainment/unclassifiable.

The facility is located in North Dakota, which is designated as attainment or unclassifiable for all criteria pollutants per 40 CFR 81.335

PSD preconstruction permitting applies to Categorical Sources as listed in 40 CFR 52.21(b)(1)(i)(a) (also known as the list of 28) that have the potential to emit above 100 tpy of any criteria pollutant or non-Categorical Sources that have the potential to emit above 250 tpy of any criteria pollutant. Compressor stations are not classified as a Categorical Source; therefore, the major source emission rate threshold for this source is 250 tpy of any criterial pollutant the facility does not have a potential to emit which exceeds the PSD major source threshold of 250 pty of any criteria pollutant, and is therefore a true minor stationary source and will remain a true minor source post modifications outlined in this submittal, as shown in Table 3-1.

Under the final rule, beginning Oct. 3, 2016, new and modified true minor sources using the FIP will be required to register using a specific form tailored to the FIP (Part 1 and Part 2 applications), rather than a permit application.

As the facility meets the definition of "oil and natural gas source" in §49.402 and meets the requirements outlined in §49.101(b) and §49.151(c)(1)(iii)(B), it is subject to the FIP requirements outlined in §49.101-105. A Part 1 form for the facility, which included a threatened or endangered species and historic properties review per the requirements of §49.104, was originally submitted on August 8, 2017 and the amended submittal was submitted on June 21, 2018. This application is being submitted to meet the Part 2 requirements. Per §49.105, Targa evaluated NSPS and NESHAP applicability for the site, as outlined in sections 4.3 and 4.4.

4.2. FEDERAL TITLE V OPERATING PERMIT PROGRAM (TITLE V) AND COMPLIANCE ASSURANCE MONITORING (CAM)

Per 40 CFR 71.3(a) and 40 CFR 71.5(a)(1), sources that have the potential to emit above 100 tpy of any criteria pollutant, 10 tpy of a single HAP, or 25 tpy of total HAPs are required to submit an operating permit application within one year of commencing operation. As shown in Table 3-1, the facility is considered a Major Source under Part 71. As operations at the Robert's Trust Compressor Station commenced on October 31, 2018, Targa will submit a Title V application separately within one year of that date. The applicability of Compliance Assurance Monitoring (CAM) as outlined in 40 CFR 64.2(a) will be addressed at that time.

4.3. NEW SOURCE PERFORMANCE STANDARDS (NSPS)

New Source Performance Standards (NSPS) are nationwide regulations that regulate air pollution from new, modified, and reconstructed stationary source categories determined to cause or contribute significantly to air pollution and that may reasonably be anticipated to endanger public health. The FIP for True Minor Oil and Gas Sources allows the following five NSPS subparts:

- Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines;
- Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines;
- Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984;
- Subpart OOOOa – Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015; and
- Subpart KKKK – Standards of Performance for New Stationary Combustion Turbines.

In addition to these subparts, Targa reviewed the following subparts to ensure that no units at the site are subject to a subpart not allowed under the FIP.

- Subpart A – General Provisions;
- Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced after August 23, 2011, and on or before September 18, 2015;
- Subpart Dc - Standard of Performance for Small Industrial-Commercial-Institutional Steam Generating Units; and
- Subpart KKK – Standards of Performance for Equipment Leaks from Onshore Natural Gas Processing Plants.

4.3.1. Subpart A - General Provision

Certain provisions of 40 CFR Part 60 Subpart A apply to the owner or operator of any stationary source subject to a NSPS. Since the Robert's Trust Compressor Station is subject to at least one NSPS subpart, the facility will comply with the applicable general requirements in Subpart A. Unless specifically excluded by the source-specific NSPS, Subpart A generally requires initial construction notification, initial startup notification, performance tests, performance test date initial notification, general monitoring requirements, general recordkeeping requirements, and semiannual monitoring and/or excess emission reports.

4.3.2. Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

NSPS Subpart IIII (NSPS IIII) applies to manufacturers, owners, and operators of stationary compression ignition internal combustion engines (ICEs). None of the engines at the facility are compression ignition engines, thus no units are subject to this subpart.

4.3.3. Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

NSPS Subpart JJJJ (Subpart JJJJ) applies to manufacturers, owners and operators of stationary spark ignition (SI) internal combustion engines (ICE) constructed (including the date the engine was ordered), modified, or reconstructed after June 12, 2006. Affected engines from §60.4230(a)(4) are the following;

- Engines manufactured on or after July 1, 2007 with horsepower greater than or equal to 500 hp (with the exception of lean burn engines with hp between 500 hp and 1,350 hp);
- Lean burn engines manufactured on or after January 1, 2008 with a maximum engine power greater than or equal to 500 hp and less than 1,350 hp;
- Engines manufactured on or after July 1, 2008 with horsepower less than 500 hp; and
- Engine manufactured on or after January 1, 2009 for emergency engines with maximum horsepower greater than 25 hp.

Engines EU 1 and 2 are four-stroke lean burn (4SLB) Caterpillar G3516LE model engines. Each engine is rated for 1,340 bhp and was manufactured prior to January 1, 2008 (June 2006 and April 2007, respectively). As such, these engines are not affected sources under §60.4230(a)(4)(ii); therefore, these two units are exempt from Subpart JJJJ.

Engine EU 15 is a 4SLB Caterpillar G3516B model engine. The engine is rated at 1,380 bhp that was manufactured after July 1, 2007 and installed on Oct. 21, 2015. EU 15 is subject to NSPS JJJJ emission limits as specified in Table 1 to Subpart JJJJ (1.0 g/hp-hr NO_x; 2.0 g/hp-hr CO, 0.7 g/hp-hr VOC). To comply with the emission limits, an oxidation catalyst will be installed to reduce exhaust emissions.

EU 27-32 are all four-stroke rich burn (4SRB) Waukesha L5794GSI model engines rated at 1,380 bhp. Each engine was manufactured after July 1, 2007 and therefore are subject to NSPS JJJJ emission limits as specified in Table 1 to Subpart JJJJ (1.0 g/hp-hr NO_x; 2.0 g/hp-hr CO, 0.7 g/hp-hr VOC). To comply with the emission limits, a NSCR catalyst will be installed to reduce exhaust emissions.

EU 3 is a 4SRB NG Engine 8.1NA model rated at 118 bhp that was manufactured after July 1, 2008 and therefore is subject to NSPS JJJJ emission limits. The unit is considered a certified engine under §60.4230(a)(4)(iii), but is being operated as non-certified. The unit is required to meet the emission standards in Table 1 of Subpart JJJJ with emission standards for NO_X of 1.0 g/hp-hr, CO of 2.0 g/hp-hr, and VOC of 0.7 g/hp-hr. It must meet the compliance requirements of §60.4234, §60.4243(a)(2)(ii), (b)(1), and (f); performance testing requirements of §60.4243(a)(2)(ii) and §60.4244; and the notification, reports, and recordkeeping requirements of §60.4245(a)(1), (2) and (4), and §60.4245(d).

EU 35 is a Doosan/PSI 21.9NGP engine rated at 507 bhp and manufactured after January 1, 2011. As such, EU 35 is also subject to NSPS JJJJ. EU 35 will be considered certified engine under §60.4230(a)(4)(iii), but will be operated as non-certified. In order to comply with the emission limits of NSPS JJJJ, Table 1 (1.0 g/hp-hr NOx; 2.0 g/hp-hr CO, 0.7 g/hp-hr VOC), EU 35 will be installed with a NSCR catalyst.

4.3.4. Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

NSPS Subpart Kb (NSPS Kb) applies to each storage vessel at a facility with a capacity greater than or equal to 75 cubic meters that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984. The largest tanks at the facility have a capacity of 400 barrels, or approximately 63.6 cubic meters, thus none of the storage tanks at the facility are subject to this rule.

4.3.5. Subpart OOOOa - Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015

NSPS Subpart OOOOa (NSPS OOOOa) applies to affected facilities in the crude oil and natural gas source category that commence construction, modification, or reconstruction after September 18, 2015. NSPS OOOOa regulates emissions and work practice standards for well affected facilities, centrifugal compressors, reciprocating compressors, pneumatic controllers, storage vessels, equipment leaks, sweetening units, and pneumatic pumps. The facility is not considered a well affected facility, and does not contain any centrifugal compressors or sweetening units. Applicability of the remaining items is outlined below.

- **Reciprocating Compressors** - Per §60.5365a(c), each reciprocating compressor affected facility, which is a single reciprocating compressor, is subject to NSPS OOOOa. The seven (7) reciprocating compressors associated with EU 15 and EU 27 through 32 meet this criteria and will be subject to NSPS OOOOa requirements. Per 40 CFR §60.5385a, reciprocating compressors are required to replace the rod packing before the compressor has operated for 26,000 hours, or prior to 36 months from the date of the most recent rod packing replacement. Alternatively, Targa could collect the methane and VOC emissions from the rod packing using a rod packing emission collection system that operates under negative pressure and route the rod packing emissions to a process through a closed vent system. Targa will comply with one of these requirements.
- **Pneumatic Controllers** - Per §60.5365a(d), a pneumatic controller at a natural gas processing plant is defined as a single continuous bleed natural gas-driven pneumatic controller. Each of the pneumatic controllers at the site are instrument air, and are not natural gas-driven. As such, the pneumatic controllers at the facility are not subject to this subpart.
- **Storage Vessels** - A storage vessel is an affected facility if it is located in the oil and natural gas production segment and has potential to emit (PTE) of 6 tpy or more VOC emissions. The condensate tanks (EU 21, 33, and 34) have the potential to emit less than 6 tpy when controlled by the vapor combustor (EU 23), so they are not subject to 40 CFR § 60.5365a(e).. While the produced water tank (EU 19) also vents to EU 23, the unit is not subject to NSPS OOOOa, thus no controls are claimed for the unit. EU 9 and EU 11 are both covered by NSPS OOOO due to construction dates.
- **Pneumatic Pumps** - Per §60.5365a(h), pneumatic pumps at natural gas processing plants are considered single natural gas-driven diaphragm pumps. The pneumatic pumps at the site are either air-assisted or electric, and thus are not natural gas-driven. As such, the pneumatic pumps at the facility are not subject to this rule.
- **Equipment Leaks** - Per §60.5365a(j), the collection of fugitive emissions components at a compressor station is an affected facility. The components are an affected facility due to the definition of modification being met with the additional compressors being added to the site. As such, the equipment leak components at the site will be subject to the compliance monitoring, recordkeeping, and emission limitations for equipment leaks as outlined in NSPS OOOOa per §60.5397.

4.3.6. Subpart OOOO - Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after August 23, 2011, and on or before September 18, 2015

NSPS Subpart OOOO (NSPS OOOO) applies to owners and operators of gas wells, centrifugal compressors, reciprocating compressors, pneumatic controllers, natural gas processing plants, storage vessels, and natural gas sweetening units that commence construction, modification, or reconstruction after August 23, 2011, and on or before September 18, 2015. The facility does not operate natural gas wells, centrifugal compressors, or sweetening units. The facility does not extract natural gas liquids or fractionate natural gas liquids to natural gas products and, therefore, is not considered a natural gas processing plant. Applicability to facility operations is as follows:

Pursuant to 40 CFR 60.5365(e), a storage vessel is an affected facility if it is located in the oil and natural gas production segment and has potential to emit (PTE) of 6 tpy or more VOC emissions. The produced water tanks (EU 9) on site has the potential to emit (PTE) less than 6 tons per year of VOCs and therefore is not an affected source under NSPS OOOO.

The condensate tank at the facility (EU 11) has the potential to emit more than 6 tpy of VOCs. EU 11 is classified as an existing, Group 1 storage vessel per §60.5430 as it was constructed after August 23, 2011 and before April 12, 2013. Group 1 storage vessels are required to have controls installed by April 15, 2015. Additionally, it is required to comply with the requirements of §60.5395(b), (d), (e), (f) and (g), §60.5410(h) and (i), §60.5411(b) and (c), §60.5412(d), §60.5415(e)(3), §60.5416(c), §60.5417(h), and §60.5420.

A vapor combustor has been installed at the facility to control emissions from the condensate tank. The vapor combustor must comply with the control requirements of §60.5395(e), the cover and closed vent requirements of §60.5411(c), the operation requirements of §60.5412(d) and continuous compliance requirements of §60.5417(h). The new combustor (EU 36) will replace the existing combustor (EU 13) and will continue to control emissions from the condensate tanks.

Per §60.5365(d), a pneumatic controller at a natural gas processing plant is defined as a single continuous bleed natural gas-driven pneumatic controller. Each of the pneumatic controllers at the site are instrument air, and are not natural gas-driven. As such, the pneumatic controllers at the facility are not subject to this subpart.

EU 1 and EU 2 were constructed before August 23, 2011 and have not been modified and are, therefore, exempt from Subpart OOOO

4.3.7. Subpart KKKK - Standards of Performance for New Stationary Combustion Turbines

NSPS Subpart KKKK (NSPS KKKK) applies to stationary combustion turbines. No turbines are located at the facility, thus no units at the site are subject to this subpart

4.3.8. Subpart Dc - Standards of Performance for Small Industrial-Commercial Institutional Steam Generating Units

NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr and less than or equal to 100 MMBtu/hr. Since all the heaters at the facility have a heat input capacity of less than 10 MMBtu/hr, unit is not subject to the requirements of Subpart Dc.

4.3.9. Subpart KKK - Standards of Performance for Equipment Leaks from Onshore Natural Gas Processing Plants

NSPS Subpart KKK (Subpart KKK) applies to equipment leaks from natural gas processing plants that were constructed after June 20, 1984 and before August 23, 2011. The facility does not extract natural gas liquids and does not meet this definition of a natural gas processing plant. Therefore, this subpart does not apply.

4.4. NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

NESHAP for Source Categories known as Maximum Available Control Technology (MACT) standards affect certain designated industrial sources referred to as "source categories" that may emit or have the potential to emit one or more of 188 designated HAPs. MACT standards (subparts) are codified in 40 CFR Part 63. The FIP for True Minor Oil and Gas Sources allows the following three NESHAP subparts:

- Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, an Institutional Boilers and Process Heaters;
- Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines; and
- Subpart HH – National Emission Standards for Hazardous Air Pollutants from Natural Gas Production Facilities

In addition to these subparts, Targa reviewed the following subparts to ensure that no units at the site are subject to a subpart not allowed under the FIP.

- Subpart A – General Provisions
- Subpart HHH – national Emission Standards for hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities
- Subpart JJJJJJ - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources

MACT standards regulate affected sources located at "major sources" and "area sources." A major source is defined in Subpart A as having the potential to emit 10 tpy of any single HAP or 25 tpy of any combination of HAPs. An area source is any source that is not a major source.

After the completion of the expansion, the facility will exceed the total HAPs thresholds, and thus will be considered a major source of HAP.

4.4.1. Subpart A - General Provisions

The General Provisions set out in Subpart A apply for any source that is regulated by any MACT standard. Individual standards under Part 63 have requirements that differ from Subpart A, whereby the requirements within the relevant rule should be followed. The U.S. EPA provides a tabular summary at the end of each MACT that specifies those General Provisions that apply and those which do not for a particular rule. Specific sections of Subpart A that apply each affected source are covered in the sections below.

4.4.2. Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, an Institutional Boilers and Process Heaters

NESHAP Subpart DDDDD (NESHAP DDDDD) applies to industrial, commercial, and institutional boilers and process heaters located at major sources of HAP. Per §63.7485, "major source" for oil and natural gas production

facilities is defined in §63.7575. Per §63.7575, for facilities that are production field facilities, only HAP emissions from glycol dehydration units and storage vessels with the potential for flash emissions shall be aggregated for major source determination. As the HAP emissions from the glycol dehydration unit and the storage vessels with the potential for flash emissions do not exceed the major source thresholds, this subpart does not apply.

4.4.3. Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines

MACT Subpart ZZZZ (NESHAP ZZZZ) applies to stationary reciprocating internal combustion engines (RICE) located at both major and area sources of HAP. After the completion of the expansion, Robert's Trust Compressor Station will become a major source for the purposes of MACT ZZZZ. MACT ZZZZ applies to RICE with greater than 500 hp constructed after December 19, 2002 and RICE with less than 500 hp constructed after June 12, 2006. All engines onsite fall into either of these categories.

EU1 and EU 2 were manufactured in June 2006 and April 2007, respectively. As the site was previously an area source, these engines were only required to comply with NSPS JJJJ per §63.6590(c). As they were manufactured prior to January 1, 2008, they were not subject to JJJJ and thus had no requirements. Now as the site is to become a major source of HAP, EU 1 and EU 2 will become subject to MACT ZZZZ per §63.6595(b)(2). Both EU 1 and EU 2 will be required to comply with the provisions of MACT ZZZZ within three (3) years of the site becoming a major source. The site became a major source as of October 31, 2018.

EU 3 is a RICE with less than 500 hp constructed after June 12, 2006 and thus is a new stationary 4SRB RICE at a major source of HAP. As such, the only requirements for EU 3 from MACT ZZZZ is to meet the requirements of NSPS JJJJ per §63.6590(c)(4).

EU 15 is a 4SLB engine with a horsepower greater than 500 and constructed after June 12, 2006, as such is a new stationary source at a major source of HAP. As the site was previously an area source, this engines was only required to comply with NSPS JJJJ per §63.6590(c). As it was manufactured after to July 1, 2007, it followed the required emission limitations. Now as the site is to become a major source of HAP, EU 15 will become subject to MACT ZZZZ per §63.6595(b)(2). EU 15 will be required to comply with the provisions of MACT ZZZZ within three (3) years of the site becoming a major source. The site became a major source as of October 31, 2018.

EU 27-32 and EU 35 are all 4SRB engines with greater than 500 hp constructed after June 12, 2006 and thus are all new stationary sources at a major source of HAP. These sources are required to be in compliance with MACT ZZZZ upon startup. The engines will comply with the required emission limitations and operating limitations as found in Tables 1a and 1b, respectively, to MACT ZZZZ. Specifically the sources will reduce formaldehyde emissions by 76% by installing an NSCR.

4.4.4. Subpart HH - National Emission Standards for Hazardous Air Pollutants from Natural Gas Production Facilities

MACT Subpart HH (NESHAP HH) applies to emission points at oil and natural gas production facilities that are HAP major or HAP area sources and that process, upgrade, or store either hydrocarbon liquids or natural gas prior to the point of custody transfer. Only HAP emissions from glycol dehydration units and storage vessels are aggregated for the major/area source determination. The facility is an area source of HAP by this definition. As an area source, the facility will be potentially subject to the requirements of Subpart HH. According to §63.760(b)(2), the affected sources at HAP area sources include the TEG dehydrator units (EU 17 and EU 26).

According to §63.764(e)(1)(i) and (ii), the owner/operator is exempt from the general standards if the flowrate of TEG is less than 3 MMscf/day to the dehydrator or if the benzene emissions from the dehydrator are less than 1.0 tpy. The TEG dehydrator units (EU 17 and EU 26) at the facility have a PTE of benzene greater than 1 tpy and throughput greater than 3 MMscf/day; therefore, the units will be subject to this subpart.

Per §63.760(f), the compliance date for the affected sources, depends on whether the affected source is located or not located in an Urban-1 county. An Urban-1 county is defined as follows (per §63.761):

"Urban-1 County is defined as a county that contains a part of a Metropolitan Statistical Area with a population greater than 250,000, based on the Office of Management and Budget's Standards for defining Metropolitan and Micropolitan Statistical Areas (December 27, 2000), and Census 2000 Data released by the U.S. Census Bureau

The 2000 Census reported Dunn County to have a population of approximately 3,600 people. Therefore, Dunn County cannot be classified as an Urban-1 county (population is less than 250,000). The construction of both dehydrators commenced after July 8, 2005. Therefore, per §63.760(f)(6), EU 17 and EU 26 should achieve compliance with the provisions of MACT HH immediately upon initial start-up.

General standards as specified in §63.764(d) depend on whether the affected sources is located within the UA plus offset and UC boundary or outside the UA plus offset and UC boundary. UA plus offset and UC boundary and other relevant definitions are defined as follows (per §63.761):

"UA plus offset and UC is defined as the area occupied by each urbanized area, each urban cluster that contains at least 10,000 people, and the area located two miles or less from each urbanized area boundary."

"Urbanized area refers to Census 2000 Urbanized Area, which is defined in the Urban Area Criteria for Census 2000 (March 15, 2002). Essentially, an urbanized area consists of densely settled territory with a population of at least 50,000 people."

"Urban cluster refers to a Census 2000 Urban Cluster, which is defined in the Urban Area Criteria for Census 2000 (March 15, 2002). Essentially, an urban cluster consists of densely settled territory with at least 2,500 people but fewer than 50,000 people."

Upon review of population data, the nearest urbanized area was identified as Bismarck. The facility is not located in Bismarck nor is it located within two miles of Bismarck. In addition, the facility is not located in an urban cluster with at least 10,000 people. Therefore, the affected area sources (EU 17 and EU 26) are not located in a UA plus offset and UC boundary. As a consequence, Targa will be required to comply with requirements specified in §63.764(d)(2) for EU 17 and EU 26 which includes the determination of the optimum glycol circulation rate, operating EU 17 and EU 26 such that the actual glycol circulation rate does not exceed the optimum glycol circulation rate and maintaining records of the determination.

Targa will comply with the appropriate notifications, recordkeeping (§63.774) and reporting requirements (§63.775) specified in the Subpart.

4.4.5. Subpart HHH - National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities

MACT Subpart HHH (NESHAP HHH) applies to emission points at natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user that are located at a major source of HAP as defined by MACT Subpart A. A compressor station that

transports natural gas prior to the point of custody transfer or to a natural gas processing plant (if present) is not considered a part of the natural gas transmission and storage source category. As such the Robert's Trust Compressor Station is not subject to MACT HHH.

4.4.6. Subpart JJJJJJ - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources

MACT Subpart JJJJJJ (NESHAP JJJJJJ) establishes emission limits, operational standards, and energy assessment requirements for HAP emissions from industrial, commercial, and institutional boilers operating within area sources of HAP emissions. As the facility will become a Major Source of HAPs after the completion of the expansion, this Subpart does not apply.

APPENDIX A: TRUE MINOR SOURCE FIP REGISTRATION FORM – PART 2

EPA Form No. 5900-391
EPA ICR No. 1230.27
OMB Control No. 2060-0003
Approval expires 4/30/2017

United States Environmental Protection Agency
https://www.epa.gov/tribal-air/tribal-minor-new-source-review
January 4, 2017

Part 2: Submit Within 60 Days After Startup of Production -- Emission and Production Information

FEDERAL IMPLEMENTATION PLAN FOR TRUE MINOR SOURCES IN INDIAN COUNTRY IN THE OIL AND NATURAL GAS PRODUCTION AND NATURAL GAS PROCESSING SEGMENTS OF THE OIL AND NATURAL GAS SECTOR

Registration for New True Minor Oil and Natural Gas Sources and Minor Modifications at Existing True Minor Oil and Natural Gas Sources

Please submit information to:

[Reviewing Authority Address Phone]	US EPA Region 8 1595 Wynkoop Street, 8P-AR Denver, CO 80202

A. GENERAL SOURCE INFORMATION (See Instructions Below)

1. Company Name Targa Badlands LLC		**2. Source Name** Robert's Trust Compressor Station	
3. Type of Oil and Natural Gas Operation Natural Gas Compression and Dehydration		**4. New Minor Source?** ☐ Yes ■ No **5. True Source Modification?** ■ Yes ☐ No	
6. NAICS Code 211111		**7. SIC Code** 1311	
8. U.S. Well ID(s) or API Number(s) [if applicable] N/A			
9. Area of Indian Country Fort Berthold Indian Reservation	**10. County** Dunn	**11a. Latitude** 47.63229°N	**11b. Longitude** 102.60386°W

B. CONTACT INFORMATION (See Instructions Below)

1. Owner Name Francis Foret	Title Senior VP Operations
Mailing Address 811 Louisiana Street, Suite 2100, Houston, TX 77002-1400	
Email Address fforet@targaresources.com	
Telephone Number 713-584-1138	Facsimile Number 713-584-1522
2. Operator Name (if different from owner) Same as Company Contact	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number
3. Source Contact Catherine Schroder	Title Senior Environmental Specialist
Mailing Address 14000 Quail Springs Parkway Suite 215, Oklahoma City, OK 73134	
Email Address cschroder@targaresources.com	
Telephone Number 405-749-5614	Facsimile Number 918-925-3841

4. Compliance Contact	Title
Mitchell Anderson	Senior Environmental Specialist
Mailing Address: 1939 125th Ave. NW, Watford City, ND 58854	
Email Address: mitchellanderson@targaresources.com	
Telephone Number: 701-842-3315	Facsimile Number

C. EMISSIONS AND OTHER SOURCE INFORMATION

Include all of the following information in the table below and as attachments to this form:

Note: The emission estimates can be based upon actual test data or, in the absence of such data, upon procedures acceptable to the Reviewing Authority. The following procedures are generally acceptable for estimating emissions from air pollution sources: (1) unit-specific emission tests; (2) mass balance calculations; (3) published, verifiable emission factors that are applicable to the unit (i.e., manufacturer specifications); (4) other engineering calculations; or (5) other procedures to estimate emissions specifically approved by the Reviewing Authority. Guidance for estimating emissions can be found at https://www.epa.gov/chief

- ■ Narrative description of the operations.
- ■ Identification and description of any air pollution control equipment and compliance monitoring devices or activities.
- ■ Type and actual amount (annually) of each fuel that will be used.
- ■ Type of raw materials used (e.g., water for hydraulic fracturing).
- ■ Actual, annual production rates.
- ■ Actual operating schedules.
- ■ Any existing limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated New Source Review (NSR) pollutants at your source. Indicate all requirements referenced in the Federal Implementation Plan (FIP) for True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector that apply to emissions units and air pollution generating activities at the source or proposed. Include statements indicating each emissions unit that is an emissions unit potentially subject to the requirements referenced in the FIP, but does not meet the definition of an affected facility under the referenced requirement, and therefore, is not subject to those requirements.
- ■ For each emissions unit comprising the new source or modification, estimates of the total allowable (potential to emit) annual emissions at startup of production from the air pollution source for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides ( ), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Allowable annual emissions are defined as: emissions rate of an emissions unit calculated using the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical

or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation, or the effect it would have on emissions, is legally and practically enforceable. You must determine the potential for emissions within 30 days from the startup of production.

■ For each emissions unit comprising the new source or modification, estimates of the total actual annual emissions during the upcoming, consecutive 12 months from the air pollution source for the following air pollutants: particulate matter (PM, PM_{10}, $PM_{2.5}$), sulfur oxides (SO_x), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia (NH_3), fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Estimates of actual emissions must take into account equipment, operating conditions, and air pollution control measures. You should calculate an estimate of the actual annual emissions using estimated operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted.

D. TABLE OF ESTIMATED EMISSIONS

Provide in the table below estimates of the total allowable annual emissions in tons per year (tpy) and total actual annual emissions (tpy) for the following pollutants for all emissions units comprising the new source or modification.

POLLUTANT	TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY)	TOTAL ACTUAL ANNUAL EMISSIONS (TPY)
PM	7.43	7.43
PM_{10}	7.43	7.43
$PM_{2.5}$	7.43	7.43
SO_x	0.27	0.27
NO_x	145.02	145.02
CO	247.14	247.14
VOC	224.85	224.85
Pb		

POLLUTANT	TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY)	TOTAL ACTUAL ANNUAL EMISSIONS (TPY)
NH3		
Fluorides		
H_2SO_4		
H_2S		
TRS		

Instructions for Part 2

Please answer all questions. If the item does not apply to the source and its operations write "n/a". If the answer is not known write "unknown".

A. General Source Information

1. Company Name: Provide the complete company name. For corporations, include divisions or subsidiary name, if any.
2. Source Name: Provide the source name. Please note that a source is a site, place, or location that may contain one or more air pollution emitting units.
3. Type of Operation: Indicate the generally accepted name for the oil and natural gas production or natural gas processing segment operation (e.g., oil and gas well site, tank battery, compressor station, natural gas processing plant).
4. New True Minor Source: [Per Federal Indian Country Minor New Source Review Rule, 40 CFR 49.153].
5. True Minor Source Modification: [Per Federal Indian Country Minor New Source Review Rule, 40 CFR 49.153].
6. North American Industry Classification System (NAICS): The NAICS Code for your oil and natural gas source can be found at the following link for North American Industry Classification System: http://www.census.gov/eos/www/naics/.
7. Standard Industrial Classification Code (SIC Code): Although the new NAICS code has replaced the SIC codes, much of the Clean Air Act permitting processes continue to use these codes. The SIC Code for your oil and natural gas source can be found at the following link for Standard Industrial Classification Codes: http://www.osha.gov/pls/imis/sic_manual.html.
8. U.S. Well ID or API Number: Unique well identifier as assigned by the Federal or State oil and gas regulatory agency with primacy, using the American Petroleum Institute (API) Standard for number format (pre-2014) or the Professional Petroleum Data Management (PPDM) Association US Well Number Standard (2014-present). Provide IDs for all oil and natural gas production wells associated with the facility, if applicable. May not be applicable for downstream production sources, such as compressor stations.
9. Area of Indian Country: Provide the name of the Indian reservation within which the source is operating.
10. County: Provide the County within which the source is operating.
11. Latitude & Longitude (11a. and 11b.): Provide latitude and longitude location(s) in decimal degrees, indicating the datum used in parentheses. These are GPS (global positioning system) coordinates. This information should be provided in decimal degrees with 6 digits to the right of the decimal point, indicating the datum used in parentheses (i.e., NAD 27, NAD 83, WGS 84 – WGS 84 is preferred over NAD 27).

B. Contact Information

Please provide the information requested in full.

1. Owners: List the full name (last, middle initial, first) of all owners of the source.
2. Operator: Provide the name of the operator of the source if it is different from the owner(s).
3. Source Contact: The source contact must be the local contact authorized to receive requests for data and information.
4. Compliance Contact: The compliance contact must be the local contact responsible for the source's compliance with this rule. If this is the same as the Source Contact please note this on the form.

C. Attachments

The information requested in the attachments will enable the U.S. Environmental Protection Agency (EPA) to understand the type of oil and natural gas source being registered and the nature and extent of the air pollutants to be emitted.

Disclaimers:

The public reporting and recordkeeping burden for this collection of information is estimated to average 6 hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Information in these forms submitted in compliance with the final Federal Indian Country Minor NSR rule may be claimed as confidential. A company may assert a claim of confidentiality for information submitted by clearly marking that information as confidential. Such information shall be treated in accordance with EPA's procedures for information claimed as confidential at 40 CFR part 2, subpart B, and will only be disclosed by the means set forth in the subpart. If no claim of confidentiality accompanies the report when it is received by EPA, it may be made public without further notice to the company (40 CFR 2.203).

APPENDIX B: POTENTIAL TO EMIT CALCULATIONS

Targa Badlands LLC - Robert's Trust Compressor Station
Potential to Emit Summary

EU	EPN	Equipment Description	Design Rating	Criteria Pollutant Emissions (tpy)					
				NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Existing Equipment									
1	1	Caterpillar G3516LE	1,340 hp	25.88	23.68	7.12	0.03	0.49	0.49
2	2	Caterpillar G3516LE	1,340 hp	25.88	23.68	7.12	0.03	0.49	0.49
3	3	NG Engine 8.1 NA	118 hp	1.14	2.28	0.89	<0.01	0.09	0.09
5	5	Tank Heater #1	0.5 MMBtu/hr	0.15	0.13	<0.01	<0.01	0.01	0.01
7	7	Pneumatic Pumps [1]	--	--	--	--	--	--	--
8	8	Methanol Storage Tank #1	1,050 gallons	--	--	0.02	--	--	--
9	36	Produced Water Tank #1 [2]	400 bbl	--	--	--	--	--	--
10	10	Produced Water Loading Losses #1	7,300 bbl/yr	--	--	0.12	--	--	--
11	36	Condensate Tank #1 [2]	400 bbl	--	--	--	--	--	--
12	12	Condensate Loading Losses #1	28,470 bbl/yr	--	--	8.37	--	--	--
13	13	Vapor Combustor #1 - REMOVED	--	--	--	--	--	--	--
14	FUG	Fugitive Emissions #1	--	--	--	10.72	--	--	--
15	15	Caterpillar G3516B	1,380 hp	6.66	26.65	14.39	0.03	0.49	0.49
16	16	Glycol Reboiler #1	0.25 MMBtu/hr	0.08	0.06	<0.01	<0.01	<0.01	<0.01
17	17	Dehy Process Vents #1	12 MMscfd	--	--	27.12	--	--	--
Existing Equipment Total				*59.79*	*76.48*	*75.87*	*0.09*	*1.57*	*1.57*
Proposed Equipment									
18	18	Methanol Storage Tank #2	1,050 gallons	--	--	0.02	--	--	--
19	23	Produced Water Tank #2 [3]	400 bbl	--	--	--	--	--	--
20	20	Produced Water Loading Losses #2	7,300 bbl/yr	--	--	0.12	--	--	--
21	23	Condensate Tank #2 [3]	400 bbl	--	--	--	--	--	--
22	22	Condensate Loading Losses #2	28,470 bbl/yr	--	--	25.11	--	--	--
23	23	Vapor Combustor #2	--	0.11	0.50	2.47	<0.01	--	--
24	FUG	Fugitive Emissions #2	--	--	--	13.63	--	--	--
25	25	Glycol Reboiler #2	0.675 MMBtu/hr	0.21	0.17	0.01	<0.01	0.02	0.02
26	26	Dehy Process Vents #2	36 MMscfd	--	--	25.44	--	--	--
27	27	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
28	28	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
29	29	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
30	30	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
31	31	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
32	32	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.90	0.90
PIGGING	PIGGING	Pig Launching / Receiving	--	--	--	17.32	--	--	--
33	23	Condensate Tank #3 [3]	400 bbl	--	--	--	--	--	--
34	23	Condensate Tank #4 [3]	400 bbl	--	--	--	--	--	--
35	35	Doosan PSI HD Generator Engine	507 hp	4.90	9.79	3.91	0.01	0.46	0.46
36	36	Vapor Combustor #1 - NEW	-	0.06	0.29	0.99	<0.01	--	--
Proposed Equipment Total				*85.23*	*170.66*	*148.98*	*0.18*	*5.86*	*5.86*
Facility Total				**145.02**	**247.14**	**224.85**	**0.27**	**7.43**	**7.43**
PSD Total [4]				**145.02**	**247.14**	**200.50**	**0.27**	**7.43**	**7.43**

1. Pneumatic pumps were replaced with air-assist pumps per August 2017 Part 1 Tribal Registration submittal, thus there are no emissions for EU 7.
2. Emissions from EU 11 (Condensate Tank #1) and EU 9 (Produced Water Tank #1) are routed through EU 36 (Vapor Combustor #1), and are thus included in the vapor combustor emission totals.
3. Emissions from EU 21, EU 33, 34 (Condensate Tank #2, #3, #4) and EU 19 (Produced Water Tank #2) are routed through EU 23 (Vapor Combustor #2), and are thus included in the vapor combustor emission totals.
4. PSD Total excludes fugitive emissions.

Targa Badlands LLC - Robert's Trust Compressor Station
Potential to Emit Summary

EU	EPN	Equipment Description	Design Rating	HAP Emissions (tpy)										
				2,2,4-TMP	Acetaldehyde	Acrolein	Benzene	E-Benzene	CH_2O	Methanol	n-Hexane	Toluene	Xylenes	Total HAP
Existing Equipment														
1	1	Caterpillar G3516LE	1,340 hp	0.01	0.50	0.31	0.03	<0.01	3.23	0.15	0.07	0.02	0.01	4.39
2	2	Caterpillar G3516LE	1,340 hp	0.01	0.50	0.31	0.03	<0.01	3.23	0.15	0.07	0.02	0.01	4.39
3	3	NG Engine 8.1 NA	118 hp	--	0.01	0.01	<0.01	<0.01	0.09	0.01	--	<0.01	<0.01	0.14
5	5	Tank Heater #1	0.5 MMBtu/hr	--	--	--	<0.01	--	<0.01	--	<0.01	<0.01	--	<0.01
7	7	Pneumatic Pumps 1	--	--	--	--	--	--	--	--	--	--	--	--
8	8	Methanol Storage Tank #1	1,050 gallons	--	--	--	--	--	--	0.02	--	--	--	0.02
9	36	Produced Water Tank #1 [2]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
10	10	Produced Water Loading Losses #1	7,300 bbl/yr	<0.01	--	--	<0.01	<0.01	--	--	<0.01	<0.01	<0.01	<0.01
11	36	Condensate Tank #1 [2]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
12	12	Condensate Loading Losses #1	28,470 bbl/yr	0.02	--	--	0.01	<0.01	--	--	0.31	0.01	<0.01	0.36
13	13	Vapor Combustor #1 - REMOVED	--	--	--	--	--	--	--	--	--	--	--	--
14	FUG	Fugitive Emissions #1	--	0.10	--	--	0.03	0.03	--	0.96	0.30	0.06	0.09	1.56
15	15	Caterpillar G3516B	1,380 hp	0.04	1.20	0.74	0.06	<0.01	1.53	0.36	0.16	0.06	0.03	7.84
16	16	Glycol Reboiler #1	0.25 MMBtu/hr	--	--	--	<0.01	--	<0.01	--	<0.01	<0.01	--	<0.01
17	17	Dehy Process Vents #1	12 MMscfd	0.02	--	--	0.89	--	--	--	0.24	0.30	--	1.45
Existing Equipment Total				*0.20*	*2.20*	*1.36*	*1.05*	*0.04*	*8.09*	*1.64*	*1.16*	*0.48*	*0.15*	*20.16*
Proposed Equipment														
18	18	Methanol Storage Tank #2	1,050 gallons	--	--	--	--	--	--	0.02	--	--	--	0.02
19	23	Produced Water Tank #2 [3]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
20	20	Produced Water Loading Losses #2	7,300 bbl/yr	<0.01	--	--	<0.01	<0.01	--	--	<0.01	<0.01	<0.01	<0.01
21	23	Condensate Tank #2 [3]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
22	22	Condensate Loading Losses #2	28,470 bbl/yr	0.05	--	--	0.04	<0.01	--	--	0.94	0.04	<0.01	1.08
23	23	Vapor Combustor #2	--	<0.01	--	--	<0.01	<0.01	--	--	0.07	<0.01	<0.01	0.08
24	FUG	Fugitive Emissions #2	--	0.14	--	--	0.05	0.04	--	0.96	0.55	0.11	0.12	1.97
25	25	Glycol Reboiler #2	0.675 MMBtu/hr	--	--	--	<0.01	--	<0.01	--	<0.01	<0.01	--	<0.01
26	26	Dehy Process Vents #2	36 MMscfd	0.02	--	--	0.84	--	--	--	0.22	0.28	--	1.35
27	27	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
28	28	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
29	29	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
30	30	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
31	31	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
32	32	Waukesha L5794GSI	1,380 hp	--	0.13	0.12	0.07	<0.01	0.67	0.14	--	0.03	<0.01	1.22
PIGGING	PIGGING	Pig Launching / Receiving	--	0.06	--	--	0.02	<0.01	--	--	0.28	0.02	0.02	0.40
33	23	Condensate Tank #3 [3]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
34	23	Condensate Tank #4 [3]	400 bbl	--	--	--	--	--	--	--	--	--	--	--
35	35	Doosan PSI HD Generator Engine	507 hp	--	0.07	0.06	0.04	<0.01	0.49	0.07	--	0.01	<0.01	0.77
36	36	Vapor Combustor #1 - NEW	-	<0.01	--	--	<0.01	<0.01	--	--	0.03	<0.01	<0.01	0.03
Proposed Equipment Total				*0.26*	*0.84*	*0.79*	*1.43*	*0.06*	*4.49*	*1.89*	*2.09*	*0.62*	*0.21*	*13.00*
Facility Total				**0.46**	**3.04**	**2.15**	**2.49**	**0.10**	**12.58**	**3.53**	**3.25**	**1.10**	**0.35**	**33.16**

1. Pneumatic pumps were replaced with air-assist pumps per August 2017 Part 1 Tribal Registration submittal, thus there are no emissions for EU 7.
2. Emissions from EU 11 (Condensate Tank #1) and EU 9 (Produced Water Tank #1) are routed through EU 36 (Vapor Combustor #1), and are thus included in the vapor combustor emission totals.
3. Emissions from EU 21, EU 33, 34 (Condensate Tank #2, #3, #4) and EU 19 (Produced Water Tank #2) are routed through EU 23 (Vapor Combustor #2), and are thus included in the vapor combustor emission totals.

Targa Badlands LLC - Robert's Trust Compressor Station
Caterpillar G3516LE Compressor - IC Engine Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 1/EPN 1, EU 2/EPN 2)					
IC Engine Make	Caterpillar		Higher Heating Value	1,436.00	Btu/scf
IC Engine Model	G3516LE		Lower Heating Value	1,308.00	Btu/scf
Power Rating[1]	1,340	bhp	Sulfur Content	0.0020	gr/scf
Heat Rate (HHV)[1]	8,342	Btu/bhp-hr	Fuel Consumption	8,546.09	scf/hr
Duty (Input)	11.18	MMBtu/hr	Fuel Consumption	74.86	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow[1]	7,417	acfm

Pollutant	Emission Factors[1,2]		Emission Rates Per Engine (lb/hr)	Emission Rates Per Engine (tpy)	Source of Emission Factors
NO_x	2.00	g/bhp-hr	5.91	25.88	Manufacturer
CO	1.83	g/bhp-hr	5.41	23.68	Manufacturer
VOC[3]	0.55	g/bhp-hr	1.62	7.12	Manufacturer
Formaldehyde	0.25	g/bhp-hr	0.74	3.23	Manufacturer
Methane	2.51	g/bhp-hr	7.42	32.48	Manufacturer
CO_2	488.00	g/bhp-hr	1,441.65	6,314.45	Manufacturer
SO_2[4]	5.88E-04	lb/MMBtu	6.57E-03	0.03	AP42 Tbl 3.2-2; 4SLB
PM_{10}[5]	9.99E-03	lb/MMBtu	0.11	0.49	AP42 Tbl 3.2-2; 4SLB
$PM_{2.5}$[5]	9.99E-03	lb/MMBtu	0.11	0.49	AP42 Tbl 3.2-2; 4SLB
TSP[5]	9.99E-03	lb/MMBtu	0.11	0.49	AP42 Tbl 3.2-2; 4SLB
Acetaldehyde[6]	3.85E-02	g/bhp-hr	0.11	0.50	AP42 Tbl 3.2-2; 4SLB (Ratio'd Factor)
Acrolein[6]	2.37E-02	g/bhp-hr	0.07	0.31	AP42 Tbl 3.2-2; 4SLB (Ratio'd Factor)
Benzene[6]	2.02E-03	g/bhp-hr	0.01	0.03	AP42 Tbl 3.2-2; 4SLB (Ratio'd Factor)
N_2O	1.00E-04	kg/MMBtu	2.46E-03	0.01	40 CFR Part 98 Table C-2
Total HAPS			1.00	4.39	AP42 Tbl 3.2-2; 4SLB

Sample Calcs:

(bhp) (Btu/bhp-hr) ($MM/10^6$) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr.

(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr.

(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr.

1. Power rating, heat rate, exhaust gas flow, and emission factors for NO_x, CO, VOC, and Formaldehyde from Caterpillar spec sheet.
2. Emission factors for HAPs based on AP-42, Chapter 3.2, Table 3.2-2 (7/00).
3. VOC emission factor includes formaldehyde.
4. SO_2 emissions based on AP-42, Chapter 3.2, Table 3.2-2 (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf.
5. Emission factor for PM_{10} & $PM_{2.5}$ from EPA, AP-42 Chapter 3.2, Table 3.2-2 (7/00), including $PM_{10}/PM_{2.5}$ filterable (7.71e-05 lb/MMBtu) & PM condensable (9.91e-3 lb/MMBtu) = 0.00999 lb/MMBtu.
6. Emission factor for Acetaldehyde, Acrolein, Benzene, and other HAPS not shown are derived by multiplying the AP-42 Factor by the ratio of Manufacturer VOC + Formaldehyde to the AP-42 VOC emission factor.

Targa Badlands LLC - Robert's Trust Compressor Station
NG Engine D081L- IC Engine Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 3/EPN 3)					
IC Engine Make	NG Engines		Higher Heating Value	1,436.00	Btu/scf
IC Engine Model	8.1NA		Lower Heating Value	1,308.00	Btu/scf
Power Rating[1]	118	bhp	Sulfur Content	0.0020	gr/scf
Heat Rate	8,573	Btu/bhp-hr	Fuel Consumption	773.41	scf/hr
Duty (input)	1.01	MMBtu/hr	Fuel Consumption	6.78	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow	894	m^3/min

Pollutant	Emission Factors[1,2]		Emission Rates (lb/hr)	Emission Rates (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	0.26	1.14	Manufacturer's Certificate of Conformity
CO	2.00	g/bhp-hr	0.52	2.28	Manufacturer's Certificate of Conformity
VOC[3]	0.78	g/bhp-hr	0.20	0.89	Manufacturer's Certificate of Conformity, AP42 Tbl 3.2-3; 4SRB
Formaldehyde	0.0205	lb/MMBtu	0.02	0.09	AP42 Tbl 3.2-3; 4SRB
Methane	0.0010	kg/MMBtu	2.23E-03	0.01	40 CFR Part 98 Table C-2
CO_2	53.0600	kg/MMBtu	118.34	518.31	40 CFR Part 98 Table C-1
SO_2[4]	5.88E-04	lb/MMBtu	5.95E-04	2.61E-03	AP42 Tbl 3.2-3; 4SRB
PM_{10}[5]	1.94E-02	lb/MMBtu	0.02	0.09	AP42 Tbl 3.2-3; 4SRB
$PM_{2.5}$[5]	1.94E-02	lb/MMBtu	0.02	0.09	AP42 Tbl 3.2-3; 4SRB
TSP[5]	1.94E-02	lb/MMBtu	0.02	0.09	AP42 Tbl 3.2-3; 4SRB
Acetaldehyde	1.08E-02	g/bhp-hr	2.82E-03	0.01	AP42 Tbl 3.2-3; 4SRB
Acrolein	1.02E-02	g/bhp-hr	2.66E-03	0.01	AP42 Tbl 3.2-3; 4SRB
Benzene	6.14E-03	g/bhp-hr	1.60E-03	0.01	AP42 Tbl 3.2-3; 4SRB
N_2O	1.00E-04	kg/MMBtu	1.01E-04	4.43E-04	40 CFR Part 98 Table C-2
Total HAPS			0.03	0.14	AP42 Tbl 3.2-3; 4SRB

Sample Calcs:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr.

(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr.

(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr.

1. Horsepower, fuel consumption and emission factors for NO_x, CO, and VOC from manufacturer spec sheet.
2. Emission factors for HAPs based on AP-42, Chapter 3.2, Table 3.2-3 (7/00).
3. VOC Emission Factor calculated by summing VOC from Manufacturer's Certificate of Conformity and Formaldehyde values from AP-42, Chapter 3.2, Table 3.2-2 (7/00).
4. SO_2 emissions based on AP-42, Chapter 3.2, Table 3.2-3 (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf.
5. Emission factor for PM10 & PM2.5 from AP-42, Chapter 3.2, Table 3.2-3 (7/00), including PM10/PM2.5 filterable (9.50-03 lb/MMBtu) & PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP EMISSIONS

HAP Compounds	AP-42 Emission Factor (lb/MMBtu)	Emission Factor[1] (g/hp-hr)	Hourly Emission Rate (lb/hr)
VOC	0.029600		
CH_2O	0.020500	0.079717	0.021
1,1,2,2-Tetrachloroethane	0.000025	0.000098	2.5594E-05
1,1,2-Trichloroethane	0.000015	0.000059	1.54778E-05
1,3-Butadiene	0.000663	0.002578	0.000670704
1,3-Dichloropropene	0.000013	0.000049	1.28476E-05
Acetaldehyde	0.002790	0.010849	0.002822418
Acrolein	0.002630	0.010227	0.002660559
Benzene	0.001580	0.006144	0.001598358
Carbon Tetrachloride	0.000018	0.000069	1.79057E-05
Chlorobenzene	0.000013	0.000050	1.30499E-05
Chloroform	0.000014	0.000053	1.38592E-05
Ethylbenzene	0.000025	0.000096	2.50882E-05
Ethylene Dibromide	0.000021	0.000083	2.15475E-05
Methanol	0.003060	0.011899	0.003095555
Methylene Chloride	0.000041	0.000160	4.16787E-05
Naphthalene	0.000097	0.000378	9.82282E-05
PAH	0.000141	0.000548	0.000142638
Styrene	0.000012	0.000046	1.20383E-05
Toluene	0.000558	0.002170	0.000564484
Vinyl Chloride	0.000007	0.000028	7.26343E-06
Xylene	0.000195	0.000758	0.000197266
TOTAL HAP EMISSIONS (lb/hr) =			**0.03**
TOTAL HAP EMISSIONS (tpy) =			**0.14**

[1] Emission Factors derived from AP-42 Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES

Targa Badlands LLC - Robert's Trust Compressor Station
Tank Heater Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Heater Data (EU 5/EPN 5)		
Emission Source:	Tank Heater	
Source Type:	Natural Gas Fired Heater	
Heat Input:	0.50	MMBtu/hr
Flow rate:	348.19	scf/hr
Flow rate:	3.05	MMscf/yr
Estimated HHV:	1,436.00	Btu/scf
Sulfur Content of Fuel:	0.0020	gr/scf
Operating Hours per Year:	8,760	hr/yr

Pollutant	Emission Factors[1]		Emission Rates	
			Hourly[2,3] (lb/hr)	Annual[4] (tpy)
NO_x	100	lb/MMscf	0.03	0.15
CO	84	lb/MMscf	0.03	0.13
VOC	5.5	lb/MMscf	1.92E-03	8.39E-03
SO_2	3.98E-04	lb/MMBtu	1.99E-04	8.71E-04
PM_{10}	7.6	lb/MMscf	2.65E-03	0.01
$PM_{2.5}$	7.6	lb/MMscf	2.65E-03	0.01
Total HAPS			6.55E-04	2.87E-03

1. Emission factors are from AP-42, Chapter 1.4, Tables 1.4-1 & 2 (7/98) for small boilers. SO_2 emissions based on AP-42, Chapter 1.4, Table 1.4-2 (7/98), which is based on 2,000 grains/MMscf and 100% conversion to SO_2.
2. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMscf) * (Flow rate, MMscf/yr) / (Operating Hours per Year, hr/yr).
3. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMBtu) * (Heat Input, MMBtu/hr).
4. Annual Emission Rate (tpy) = (Hourly Emission Rate, lb/hr) * (Operating Hours per Year, hr/yr) / (2,000 lb/ton).

GHG Calculations				
Pollutant	Uncontrolled Emission Factors[1]		Uncontrolled Emission (lb/hr)	Uncontrolled Emission (tpy)
CO_2	120,000	lb/MMscf	41.78	183.01
CH_4	2.30	lb/MMscf	8.01E-04	3.51E-03
N_2O	2.20	lb/MMscf	7.66E-04	3.36E-03
CO_2e^1	--	--	42.03	30.18

1. Emission factors from AP-42, Chapter 1.4, Table 1.4-2 (7/98) for small boilers.
2. CO_2e emissions calculated using Global Warming Potentials from 40 CFR 98, Subpart A, Table A-1.

Targa Badlands LLC - Robert's Trust Compressor Station
Tank Heater Hazardous Air Pollutant Emissions Calculations

Robert's Trust Compressor Station Reboiler Data (EU 5/EPN 5)		
Emission Source:	Tank Heater	
Source Type:	Natural Gas Fired Heater	
Heat Input:	0.50	MMBtu/hr
Flow rate:	348.19	scf/hr
Flow rate:	3.05	MMscf/yr
Estimated HHV:	1,436.00	Btu/scf
Sulfur Content of Fuel:	0.0020	gr/scf
Operating Hours per Year:	8,760.00	hr/yr

Pollutant	Emission Factors[1] (lb/MMscf)	Emission Rates[2,3]	
		(lb/hr)	(tpy)
2-Methylnaphthalene	2.40E-05	8.36E-09	3.66E-08
3-Methylchloranthrene	1.80E-06	6.27E-10	2.75E-09
7,12-Dimethylbenz(a)anthracene	1.60E-05	5.57E-09	2.44E-08
Acenaphthene	1.80E-06	6.27E-10	2.75E-09
Acenaphthylene	1.80E-06	6.27E-10	2.75E-09
Anthracene	2.40E-06	8.36E-10	3.66E-09
Benz(a)anthracene	1.80E-06	6.27E-10	2.75E-09
Benzene	2.10E-03	7.31E-07	3.20E-06
Benzo(a)pyrene	1.20E-06	4.18E-10	1.83E-09
Benzo(b)fluoranthene	1.80E-06	6.27E-10	2.75E-09
Benzo(g,h,i)perylene	1.20E-06	4.18E-10	1.83E-09
Benzo(k)fluoranthene	1.80E-06	6.27E-10	2.75E-09
Chrysene	1.80E-06	6.27E-10	2.75E-09
Dibenzo(a,h)anthracene	1.20E-06	4.18E-10	1.83E-09
Dichlorobenzene	1.20E-03	4.18E-07	1.83E-06
Fluoranthene	3.00E-06	1.04E-09	4.58E-09
Fluorene	2.80E-06	9.75E-10	4.27E-09
Formaldehyde	7.50E-02	2.61E-05	1.14E-04
Hexane	1.80E+00	6.27E-04	2.75E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	6.27E-10	2.75E-09
Naphthalene	6.10E-04	2.12E-07	9.30E-07
Phenanathrene	1.70E-05	5.92E-09	2.59E-08
Pyrene	5.00E-06	1.74E-09	7.63E-09
Toluene	3.40E-03	1.18E-06	5.19E-06
Heater Total HAPs (tpy)			**2.87E-03**

1. Emission factors from AP-42, Chapter 1.4, Table 1.4-3 (7/98).

2. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMscf) * (Flow Rate, MMscf/yr) / (Operating Hours per Year, hr/yr).

3. Annual Emission Rate (tpy) = (Average Hourly Emission Rate, lb/hr) * (8,760 hr/yr) / (2,000 lb/ton).

Targa Badlands LLC - Robert's Trust Compressor Station
Produced Water Tanks Emission Calculations

Robert's Trust Compressor Station Produced Water Tank Data				
EU/EPN Number	EU 9/EPN 36		EU 19/EPN 23	
Emission Source	Produced Water Tank		Produced Water Tank	
Source Type	Tank		Tank	
Tank Volume	400	bbl	400	bbl
Annual Throughput[1]	20,668	bbl/yr	20,668	bbl/yr
Working Losses[1,2]	3.61E-03	lb/hr	3.61E-03	lb/hr
Breathing Losses[1,2]	1.18E-03	lb/hr	1.18E-03	lb/hr
Average Hourly Flash Losses[1,2]	-	lb/hr	-	lb/hr
Average Annual Flash Losses[1,2]	-	tpy	-	tpy
Total Hourly Uncontrolled Emissions	4.79E-03	lb/hr	4.79E-03	lb/hr
Total Annual Uncontrolled Emissions	0.02	tpy	0.02	tpy

	Weight Percent				Uncontrolled Produced Water Tank Emissions - Single Tank			Controlled Produced Water Tank Emissions - Single Tank		Controlled Produced Water Tank Emissions - Two Tanks	
Pollutant	Working	Breathing	Flash [2] (hourly)	Flash [2] (annual)	(lb/hr)	(tpy)	Control Efficiency [3] (%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
VOC [4]	100.00%	100.00%	100.00%	100.00%	4.79E-03	0.02	0%	4.79E-03	0.02	9.58E-03	0.04
2,2,4-TMP	0.19%	0.19%	0.13%	0.13%	9.05E-06	3.96E-05	0%	9.05E-06	3.96E-05	1.81E-05	7.93E-05
Benzene	0.17%	0.17%	0.21%	0.21%	8.30E-06	3.64E-05	0%	8.30E-06	3.64E-05	1.66E-05	7.27E-05
Ethylbenzene	0.01%	0.01%	0.01%	0.01%	6.67E-07	2.92E-06	0%	6.67E-07	2.92E-06	1.33E-06	5.84E-06
n-Hexane	3.75%	3.75%	2.72%	2.72%	1.80E-04	7.87E-04	0%	1.80E-04	7.87E-04	3.59E-04	1.57E-03
Toluene	0.15%	0.15%	0.17%	0.17%	7.35E-06	3.22E-05	0%	7.35E-06	3.22E-05	1.47E-05	6.44E-05
Xylenes	0.02%	0.02%	0.02%	0.02%	1.03E-06	4.51E-06	0%	1.03E-06	4.51E-06	2.06E-06	9.03E-06
Total HAP	4.30%	4.30%	3.26%	3.26%	2.06E-04	9.02E-04	0%	2.06E-04	9.02E-04	4.12E-04	1.80E-03

1. Produced water losses assume a combined throughput of 113.25 bbl/day is split evenly between both tanks.
2. Working, breathing, and flash losses and weight percents based off of annual produced water ProMax results, ran 7/2018. Hourly losses assume annual losses are emitted evenly over 8,760 hours per year.
3. As uncontrlled emissions from each tank are below 6 tpy, neither produced water tank is subject to NSPS OOOOa. As such, no control is claimed from the VCU.
4. VOC weight percentage assumed to be 100% for working and breathing losses.

GHG	Losses Source (lb/hr)				Per Produced Water Tank Emissions		All the Produced Water Tanks (EU 9, EU 19) Emissions	
	Working [1, 2]	Breathing [1, 2]	Flash [1, 2] (hourly)	Flash [1, 2] (annual)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
CO_2	-	-	-	-	-	-	-	-
CH_4	-	-	-	-	-	-	-	-
N_2O	-	-	-	-	-	-	-	-
CO_2e [3]	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1. Working, breathing, and flash losses and weight percent based off of hourly and annual ProMax results, run 7/2018. Working and breathing losses
2. Produced water losses assume a combined throughput of 113.25 bbl/day is split evenly between both tanks.
3. Per 40 CFR 98 - Mandatory Greenhouse Gas Reporting, Subpart A, Table A-1. Total CO_2e emissions are calculated based on the following Global Warming Potentials (GWPs).

GHG	GWP
CO_2	1
CH_4	25
N_2O	298

Targa Badlands LLC - Robert's Trust Compressor Station
Loading Loss Emission Calculations

Equation[1]:

$$L_L = \frac{12.46 * SPM}{T}$$

Variables[1]:

L_L - Loading Loss (lbs/1000 gal loaded)
S - Saturation Factor (From Table 5.2-1 of AP-42, Section 5.2)
P - True Vapor Pressure of Loaded Liquid (psia)
M - Molecular Weight of Vapor (lb/lb mol)
T- Temperature of Bulk Liquid (°R = [°F + 460])

Robert's Trust Compressor Station Loading Data (EU 10/EPN 10, EU 12/EPN 12)

EU	Material Loaded	Loading Method	S	P_{max}[2] (psia)	M (lb/lbmol)	T[3] (°R)	L_L (lbs/1000 gal)	Max Hourly Throughput[4] (gal/hr)	Max Hourly Emissions[5] (lb/hr)
10	Produced Water	Submerged	0.60	13.85	60.8	500.67	12.5819	10,500	2.80
12	Condensate	Submerged	0.60	13.85	60.9	500.22	12.5991	10,500	132.29

EU	Material Loaded	Loading Method	S	P_{max}[2] (psia)	M (lb/lbmol)	T[3] (°R)	L_L (lbs/1000 gal)	Total Annual Throughput[4] (gallons/yr)	Annual Emissions[5] (tpy)
10	Produced Water	Submerged	0.60	13.85	60.8	500.67	12.5819	868,061	0.12
12	Condensate	Submerged	0.60	13.85	60.9	500.22	12.5991	1,328,804	8.37

1. Loading Loss Equation and Variables are from AP-42, Chapter 5.2 (6/08).
2. The vapor pressure for the maximum hourly and annual average emission rate is based on the bubble point pressure from the ProMax files run 7/2018. As only an annual analysis was completed, hourly pressure assumed equal to annual pressure.
3. Temperature from ProMax files run 7/2018. As only an annual analysis was completed, hourly temperature assumed equal to annual pressure.
4. The maximum hourly throughput is based on the loading of one 250 barrel tank truck in one-hour. The total annual throughput is based on the total annual throughput for condensate and produced water storage tanks.
5. Loading emissions for produced water were calculated using the properties of pure condensate and multiplying by a factor of 2.2% to account for the VOC content of the produced water stream in ProMax.

Components	Condensate Vapor Weight %[1]	Hourly Condensate Loading Losses[2] (lb/hr)	Annual Condensate Loading Losses[2] (tpy)	PW Vapor Weight %[1]	Hourly PW Loading Losses[2] (lb/hr)	Annual PW Loading Losses[2] (tpy)
2,2,4-TMP	0.19%	0.25	0.02	0.19%	5.29E-03	2.19E-04
Benzene	0.17%	0.23	0.01	0.17%	4.85E-03	2.01E-04
Ethylbenzene	0.01%	0.02	1.17E-03	0.01%	3.90E-04	1.61E-05
n-Hexane	3.75%	4.96	0.31	3.75%	0.10	4.34E-03
Toluene	0.15%	0.20	1.28E-02	0.15%	4.29E-03	1.77E-04
m-Xylene	0.00%	0.00	2.79E-04	0.00%	9.32E-05	3.85E-06
p-Xylene	0.02%	0.02	1.30E-03	0.02%	4.34E-04	1.79E-05
o-Xylene	0.00%	0.00	2.25E-04	0.00%	7.52E-05	3.11E-06
Total HAP	4.30%	5.69	0.36	4.30%	0.12	0.00

1. Vapor weight percent based on working and breathing losses.
2. Total HAP calculated by multiplying the vapor weight % of each constituent by the total hourly or annual throughputs of condensate and produced water.

Targa Badlands LLC - Robert's Trust Compressor Station
Condensate Tanks Emission Calculations

Robert's Trust Compressor Station Condensate Tank Data								
EU/EPN Number	EU 11/EPN 36		EU 21/EPN 23		EU 33/EPN 23		EU 34/EPN 23	
Emission Source	Condensate Tank		Condensate Tank		Condensate Tank		Condensate Tank	
Source Type	Tank		Tank		Tank		Tank	
Tank Volume	400	bbl	400	bbl	400	bbl	400	bbl
Annual Throughput [1]	31,638	bbl/yr	31,638	bbl/yr	31,638	bbl/yr	31,638	bbl/yr
Working Losses [1,2]	0.92	lb/hr	0.92	lb/hr	0.92	lb/hr	0.92	lb/hr
Breathing Losses [1,2]	1.22	lb/hr	1.22	lb/hr	1.22	lb/hr	1.22	lb/hr
Average Hourly Flash Losses [1,2]	1.24	lb/hr	1.24	lb/hr	1.24	lb/hr	1.24	lb/hr
Average Annual Flash Losses [1,2]	5.41	tpy	5.41	tpy	5.41	tpy	5.41	tpy
Total Hourly Uncontrolled Emissions	3.38	lb/hr	3.38	lb/hr	3.38	lb/hr	3.38	lb/hr
Total Annual Uncontrolled Emissions	14.80	tpy	14.80	tpy	14.80	tpy	14.80	tpy

	Weight Percent				Uncontrolled Condensate Tank Emissions - Single Tank			Controlled Condensate Tank Emissions - Single Tank		Controlled Condensate Tank Emissions - Four Tanks	
Pollutant	Working	Breathing	Flash[2] (hourly)	Flash[2] (annual)	(lb/hr)	(tpy)	Control Efficiency (%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
VOC[4]	100.00%	100.00%	100.00%	100.00%	3.38	14.80	95%	0.17	0.74	0.68	2.96
2,2,4-TMP	0.19%	0.19%	0.13%	0.13%	<0.01	0.02	95%	2.84E-04	1.24E-03	1.13E-03	4.97E-03
Benzene	0.17%	0.17%	0.21%	0.21%	<0.01	0.03	95%	3.14E-04	1.38E-03	1.26E-03	5.51E-03
Ethylbenzene	0.01%	0.01%	0.01%	0.01%	<0.01	<0.01	95%	2.32E-05	1.01E-04	9.26E-05	4.06E-04
n-Hexane	3.75%	3.75%	2.72%	2.72%	0.11	0.50	95%	5.70E-03	0.02	0.02	0.10
Toluene	0.15%	0.15%	0.17%	0.17%	<0.01	0.02	95%	2.68E-04	1.18E-03	1.07E-03	4.70E-03
Xylenes	0.02%	0.02%	0.02%	0.02%	<0.01	<0.01	95%	3.66E-05	1.60E-04	1.46E-04	6.41E-04
Total HAP	4.30%	4.30%	3.26%	3.26%	0.13	0.58	95%	6.62E-03	0.03	0.03	0.12

1. Condensate tank losses based on a throughput through all four condensate tanks of 346.72 bbl/day. Throughput assumed to be split equally between all four tanks.
2. Working, breathing, and flash losses and weight percents based off of annual condensate ProMax results, ran 07/2018. Hourly based on annual file, and values assumed to be equal for 8,760 hours of operation per year.
3. As each condensate tank is subject to NSPS OOOOa, emissions from the condensate tanks are controlled by the vapor combustor, EPN 23.
4. VOC weight percentage assumed to be 100% for working and breathing losses.

GHG	Losses Source (lb/hr)				Per Condensate Tank Emissions		All the Condensate Tanks (EU 11, EU 21, EU 33, EU 34) Emissions	
	Working [1,2]	Breathing [1,2]	Flash [1,2] (hourly)	Flash [1,2] (annual)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
CO_2	-	-	-	-	-	-	-	-
CH_4	-	-	0.32	0.32	0.32	1.40	1.28	5.61
N_2O	-	-	-	-	-	-	-	-
CO_2e [3]	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1. Working, breathing, and flash losses and weight percent based off of hourly and annual ProMax results, run 7/2018. Working and breathing losses assume 100% VOC.
2. Condensate tank losses based on a throughput through all four condensate tanks of 346.72 bbl/day. Throughput assumed to be split equally between all four tanks.
3. Per 40 CFR 98 - Mandatory Greenhouse Gas Reporting, Subpart A, Table A-1. Total CO_2e emissions are calculated based on the following Global Warming Potentials (GWPs).

GHG	GWP
CO_2	1
CH_4	25
N_2O	298

Targa Badlands LLC - Robert's Trust Compressor Station
Fugitive Emission Calculations

Robert's Trust Compressor Station Fugitives Rate (EU-14, EPN P102)																																				
						HAP/VOC Emissions:																																
		Equipment Type[1]	Emission Factors[2] (kg/hr/source)	Count[3]	Hourly Emission (lb/hr)	Annual Emission (tpy)	VOC			2,2,4-TMP			Benzene			Ethylbenzene			Methanol			n-Hexane			Toluene			Xylenes			Methane			GWP	CO2e	
Service	Service Type						(wt %)	(lb/hr)[4]	(tpy)[4]	(wt %)	(lb/hr)[4]	(tpy)[4]	(wt %)	(lb/hr)[4]	(tpy)[4]	(wt %)	(lb/hr)[4]	(tpy)[4]	(wt %)	(lb/hr)[4]	(tpy)[4]	(wt %)	(lb/hr)[4]	(tpy)[4]	(wt %)	(lb/hr)[4]	(tpy)[4]	(wt %)	(lb/hr)[4]	(tpy)[4]	(wt %)	(lb/hr)[4]	(tpy)[4]		(lb/hr)[4]	(tpy)[4]	(lb/hr)[4]	(tpy)[4]
Gas	Flash gas [5]	Valves	4.50E-03	168	1.67	6.85	99.81%	0.96	3.95	0.11%	2.65E-03	0.01	0.09%	1.81E-03	4.41E-03	0.03%	5.76E-05	2.51E-04	0.00%	-	-	0.00%	0.01	0.05	0.02%	4.41E-04	1.93E-03	0.01%	1.38E-04	6.03E-04	21.69%	0.73	3.20	1.87%	0.02	0.11	18.81	82.22
		Pump Seals	0.00E+00	0	-	-																																
		Others	8.80E-03	15	0.29	1.27																																
		Flanges / Connectors	8.60E-04	401	0.61	1.81																																
		Open-Ended	2.00E-03	1	5.47E-03	0.02																																
		Total Flash Gas			2.57	10.00																																
Light Oil	Condensate [6]	Valves	2.50E-03	65	0.89	3.90	99.68%	0.11	0.48	1.09%	2.07E-03	9.08E-03	0.05%	5.71E-04	4.26E-03	3.77%	0.041544	0.181993	0.00%	-	-	11.09%	0.01	0.05	7.77%	1.06E-01	0.01	1.94%	1.66E-03	0.01	0.07%	2.41E-05	1.06E-04	0.00%	-	-	0.02E-06	1.64E-03
		Pump Seals	1.30E-02	0	-	-																																
		Others	7.50E-03	0	-	-																																
		Flanges / Connectors	2.10E-04	98	0.03	0.12																																
		Flanges	1.10E-04	0	-	-																																
		Open-Ended	1.40E-03	0	-	-																																
		Total Condensate			0.13	0.49																																
	Methanol [7]	Valves	1.30E-03	31	0.17	0.73	100.00%	0.22	0.96	0.00%	-	-	0.00%	-	-	0.00%	-	-	100.00%	0.22	0.96	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	-	-
		Pump Seals	1.30E-02	0	-	-																																
		Others	7.50E-03	0	-	-																																
		Flanges / Connectors	2.10E-04	102	0.05	0.21																																
		Flanges	1.10E-04	0	-	-																																
		Open-Ended	1.40E-03	0	-	-																																
		Total Methanol			0.22	0.96																																
Oil/Water	Produced Water [8]	Valves	5.00E-03	81	0.81	0.85	2.12%	1.58E-03	6.91E-03	0.04%	2.97E-05	1.31E-04	0.07%	1.40E-04	6.14E-04	3.02%	1.77E-03	5.31E-03	0.00%	-	-	0.29%	1.01E-04	0.18E-04	0.05%	4.20E-04	1.92E-04	0.03%	2.11E-05	9.24E-05	0.00%	3.40E-07	1.52E-06	0.00%	-	-	6.78E-06	3.01E-05
		Pump Seals	2.40E-03	0	-	-																																
		Others	1.60E-02	0	-	-																																
		Flanges / Connectors	1.10E-04	761	0.06	0.24																																
		Flanges	2.50E-04	0	-	-																																
		Open-Ended	1.50E-04	0	-	-																																
		Total Produced Water			0.87	3.83																																
Heavy Oil	Triethylene Glycol (TEG) [9]	Valves	8.40E-03	24	4.44E-04	1.95E-03	100.00%	2.05E-03	8.99E-03	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	-	-
		Pump Seals	NA	0																																		
		Others	1.70E-02	5	9.37E-04	4.10E-03																																
		Flanges / Connectors	7.50E-06	77	1.27E-03	5.56E-03																																
		Flanges	3.70E-07	0	-	-																																
		Open-Ended	1.40E-04	0	-	-																																
		Total TEG			2.31E-03	8.97E-03																																
Crude Oil (Pumping Station)	Crude Oil (Light Oil)	Valves	2.50E-03	168	0.93	4.06	93.03%	1.21	5.32	1.43%	0.02	0.08	0.42%	5.47E-03	0.02	3.42%	5.98E-03	0.02	0.00%	-	-	3.40%	0.04	0.19	8.75%	5.13E-01	0.04	1.63%	0.02	0.07	0.00%	4.62E-05	2.03E-04	0.00%	-	-	1.16E-03	5.09E-03
		Pump Seals	1.30E-02	0	-	-																																
		Others	7.50E-03	14	0.15	0.46																																
		Flanges / Connectors	1.10E-04	219	0.11	0.48																																
		Open-Ended	1.40E-03	1	-	-																																
		Total Crude Oil			1.19	5.33																																
							Emission Totals:	3.65	15.72	-	0.01	0.03	-	1.41E-03	0.01	-	6.99E-03	0.03	-	0.22	0.96	-	0.07	0.30	-	0.01	0.02	-	0.05	0.20	-	9.73	3.20	-	0.01	0.11	18.81	82.22

1. Emission factors are from Table 2-4 of the "Protocol for Equipment Leak Emission Estimates", EPA-453/R-95-017.
2. Component counts are estimated using facility physical drawings. Flanges and connectors are grouped together and utilize the worst-case emission factor for flanges or connectors for each service.
3. Hourly Emission Rate (lb/hr) = (Emission Factor (kg/hr/source) * 2.2046 kg/lb) / (453.59 g/lb) * (wt %)
4. Annual Emission Rate (tpy) = (Hourly Emission Rate, lb/hr) * (8760 hr/yr) / (2,000 lb/ton)
5. Flash gas composition obtained from inlet gas analysis performed 5/16/2014.
6. Condensate stream and produced water composition based on facility ProMax results, run 7/2018.
7. Light oil methanol stream assumed to be 100% methanol/VOC
8. Triethylene glycol stream assumed to be 100% VOC.

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TOC Total		
Pollutant	lb/hr	tpy
VOC	3.65	15.72
Benzene	0.01	0.03
2,2,4-TMP	0.00	0.00
Ethylbenzene	0.07	0.30
Toluene	0.01	0.02
n-Hexane	0.22	0.96
Other HAP	0.01	0.04
Total HAP	0.31	1.35
CO2	0.01	0.20
Methane	1.81	7.91
CO2e	40.01	172.16

Targa Badlands LLC - Robert's Trust Compressor Station
Caterpillar 3516B Compressor - IC Engine Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 15/EPN 15)			
IC Engine Make	Caterpillar	**Higher Heating Value**	1,436 Btu/scf
IC Engine Model	G3516B	**Lower Heating Value**	1,308 Btu/scf
Power Rating	1,380 bhp	**Sulfur Content**	0.0020 gr/scf
Heat Rate (HHV)	8,146 Btu/bhp-hr	**Fuel Consumption**	8,594.4 scf/hr
Duty (input)	11.24 MMBtu/hr	**Fuel Consumption**	75.3 MMscf/yr
Hours per Year	8,760 hr/yr	**Exhaust Gas Flow**	9,254 acfm

Pollutant	Uncontrolled Emission Factors	Uncontrolled		Source of Emission Factors
		lb/hr	TPY	
NO_x	0.50 g/bhp-hr	1.521	6.66	Manufacturer
CO	3.02 g/bhp-hr	9.188	40.24	Manufacturer
VOC	1.88 g/bhp-hr	5.720	25.05	Manufacturer (Includes Formaldehyde)
Formaldehyde	0.38 g/bhp-hr	1.156	5.06	Manufacturer
Methane	1.59 g/bhp-hr	4.837	21.19	Manufacturer
CO_2	516.00 g/bhp-hr	1,569.88	6,876.06	Manufacturer
SO_2	0.00059 lb/MMBtu	0.007	0.029	AP42 Tbl 3.2-2; 4SLB
PM_{10}	0.00999 lb/MMBtu	0.112	0.492	AP42 Tbl 3.2-2; 4SLB
$PM_{2.5}$	0.00999 lb/MMBtu	0.112	0.492	AP42 Tbl 3.2-2; 4SLB
TSP	0.00999 lb/MMBtu	0.112	0.492	AP42 Tbl 3.2-2; 4SLB
Acetaldehyde[6]	0.0898 g/bhp-hr	0.273	1.196	AP42 Tbl 3.2-2; 4SLB (Ratio'd Factor)
Acrolein[6]	0.06 g/bhp-hr	0.168	0.735	AP42 Tbl 3.2-2; 4SLB (Ratio'd Factor)
Benzene[6]	0.00 g/bhp-hr	0.014	0.063	AP42 Tbl 3.2-2; 4SLB (Ratio'd Factor)
N_2O	0.00010 kg/MMBtu	0.002	0.011	40 CFR Part 98 Table C-2
Total HAPS		1.79	7.84	AP42 Tbl 3.2-2; 4SLB

Pollutant	Controlled Emission Factors	Controlled		Source of Emission Factors
		lb/hr	TPY	
CO	2.00 g/bhp-hr	6.085	26.65	NSPS JJJJ Limit
VOC	1.08 g/bhp-hr	3.286	14.39	NSPS JJJJ Limit + Formaldehyde
Formaldehyde	0.115 g/bhp-hr	0.350	1.533	MACT ZZZZ Limit

Sample Calcs:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr

(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr; (lb/hr) (100 - % control) / 100 = lb/hr

(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr; (tpy) (100 - % control) / 100 = tpy

Notes:

Horsepower, fuel consumption and uncontrolled emission factors for NO_x, CO, VOC, Formaldehyde, Methane, and CO2 from Caterpillar spec sheet

SO_2 emissions based on AP42 Table 3.2-2, which is based on 100% conversion of sulfur to SO_2 at 2000 grains/MMscf.

Emission factor for PM_{10} & $PM_{2.5}$from EPA, AP-42 Chapter 3.2, Table 3.2-2, including PM_{10}/$PM_{2.5}$ filterable (7.71e-05 lb/MMBtu) & PM condensable (9.91e-3 lb/MMBtu) = 0.00999 lb/MMBtu.

Catalyst-controlled emission factors for CO and VOC are maximum NSPS JJJJ limits. VOC includes Formaldehyde.

Emission factor for Acetaldehyde, Acrolein, Benzene, and other HAPS not shown are derived by multiplying the AP-42 Factor by the ratio of Manufacturer VOC + Formaldehyde to the AP-42 VOC emission factor.

MACT ZZZZ formaldehyde limit is 14 ppmvd @15% O2. Limit is converted to g/hp-hr as follows: 14 ppmv * [(20.9-0)/(20.9-15)] / (1,000,000) * [97913.29 dscfh - (Based on EPA Method 19)] / (416.58 scf/lb-mol) * (30.025 lb/lb-mol) * (453.59 g/lb) / (1,380 hp) = 0.115 g/hp-hr

HAP EMISSIONS

HAP Compounds	AP-42 Emission Factor (lb/MMBtu)	Emission Factor[1] (g/hp-hr)	Hourly Emission Rate (lb/hr)
			15
VOC	0.11800		
CH_2O	0.05280	0.566874	1.156
1,1,2,2-Tetrachloroethane	0.00004	0.000429	0.00130656
1,1,2-Trichloroethane	0.00003	0.000341	0.00103871
1,3-Butadiene	0.00027	0.002867	0.00872127
1,3-Dichloropropene	0.00003	0.000283	0.00086233
2-Methylnaphthalene	0.00003	0.000356	0.00108444
2,2,4-Trimethylpentane	0.00025	0.002684	0.00816598
Acenaphthene	0.00000	0.000013	4.083E-05
Acenaphthylene	0.00001	0.000059	0.00018063
Acetaldehyde	0.00836	0.089755	0.27307039
Acrolein	0.00514	0.055184	0.16789256
Benzene	0.00044	0.004724	0.01437213
Benzo(b)fluoranthene	0.00000	0.000002	5.4222E-06
Benzo(e)pyrene	0.00000	0.000004	1.3556E-05
Benzo(g,h,i)perylene	0.00000	0.000004	1.3523E-05
Biphenyl	0.00021	0.002276	0.00692475
Carbon Tetrachloride	0.00004	0.000394	0.00119877
Chlorobenzene	0.00003	0.000326	0.00099298
Chloroform	0.00003	0.000306	0.00093092
Chrysene	0.00000	0.000007	2.2636E-05
Ethylbenzene	0.00004	0.000426	0.00129676
Ethylene Dibromide	0.00004	0.000476	0.00144701
Fluoranthene	0.00000	0.000012	3.6257E-05
Fluorene	0.00001	0.000061	0.0001852
Methanol	0.00250	0.026841	0.0816598
Methylene Chloride	0.00002	0.000215	0.00065328
n-Hexane	0.00111	0.011917	0.03625695
Naphthalene	0.00007	0.000799	0.0024302
PAH	0.00003	0.000289	0.00087866
Phenanthrene	0.00001	0.000112	0.0003397
Phenol	0.00002	0.000258	0.00078393
Pyrene	0.00000	0.000015	4.4423E-05
Styrene	0.00002	0.000253	0.00077087
Tetrachloroethane	0.00000	0.000027	8.1007E-05
Toluene	0.00041	0.004380	0.01332688
Vinyl Chloride	0.00001	0.000160	0.00048669
Xylene	0.00018	0.001975	0.00601016
	TOTAL HAP EMISSIONS (lb/hr) =		1.79

TOTAL HAP EMISSIONS (tpy) =	7.84

[1] Emission Factors derived from AP-42 Table 3.2-2. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE LEAN-BURN ENGINES

Factors were ratio'd from the AP-42 VOC factor to the Manufacturer VOC factor in the same proportion

Targa Badlands LLC - Robert's Trust Compressor Station
Glycol Reboiler Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Reboiler Data (EU 16/ EPN 16)		
Emission Source	Glycol Reboiler	
Source Type	Natural Gas Fired Heater	
Heat Input	0.25	MMBtu/hr
Flow Rate	174.09	scf/hr
Flow Rate	1.53	MMscf/yr
Estimated HHV	1,436.00	Btu/scf
Sulfur Content of Fuel	0.0020	gr/scf
Operating Hours per Year	8,760	hr/yr

Pollutant	Emission Factors[1]		Emission Rates	
			Hourly[2,3] (lb/hr)	Annual[4] (tpy)
NO_x	100	lb/MMscf	0.02	0.1
CO	84	lb/MMscf	0.01	6.41E-02
VOC	5.5	lb/MMscf	9.58E-04	4.19E-03
SO_2	3.98E-04	lb/MMBtu	9.94E-05	4.35E-04
PM_{10}	7.6	lb/MMscf	1.32E-03	5.80E-03
$PM_{2.5}$	7.6	lb/MMscf	1.32E-03	5.80E-03

1. Emission factors are from AP-42, Chapter 1.4, Tables 1.4-1 & 2 (7/98) for small boilers. SO_2 emissions based on AP-42, Chapter 1.4, Table 1.4-2 (7/98), which is based on 2,000 grains/MMscf and 100% conversion to SO_2.
2. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMscf) * (Flow rate, MMscf/yr) / (Operating Hours per Year, hr/yr).
3. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMBtu) * (Heat Input, MMBtu/hr).
4. Annual Emission Rate (tpy) = (Hourly Emission Rate, lb/hr) * (Operating Hours per Year, hr/yr) / (2,000 lb/ton).

GHG Calculations				
Pollutant	Uncontrolled Emission Factors[1]		Uncontrolled Emission Rates (lb/hr)	Uncontrolled Emission Rates (tpy)
CO_2	120,000	lb/MMscf	20.89	91.50
CH_4	2.30	lb/MMscf	4.00E-04	1.75E-03
N_2O	2.20	lb/MMscf	3.83E-04	1.68E-03
CO_2e[1]	--	--	21.02	15.09

1. Emission factors from AP-42, Chapter 1.4, Table 1.4-2 (7/98) for small boilers.

2. CO_2e emissions calculated using Global Warming Potentials from 40 CFR 98, Subpart A, Table A-1. These factors are as follows:

Targa Badlands LLC - Robert's Trust Compressor Station
Glycol Reboiler Hazardous Air Pollutant Emissions Calculations

Robert's Trust Compressor Station Reboiler Data (EU 16/EPN 16)		
Emission Source	Glycol Reboiler	
Source Type	Natural Gas Fired Heater	
Heat Input	0.25	MMBtu/hr
Flow Rate	174.09	scf/hr
Flow Rate	1.53	MMscf/yr
Estimated HHV	1,436.00	Btu/scf
Sulfur Content of Fuel	0.0020	gr/scf
Operating Hours per Year	8,760	hr/yr

Pollutant	Emission Factors[1] (lb/MMscf)	Emission Rates[2,3]	
		(lb/hr)	(tpy)
2-Methylnaphthalene	2.40E-05	4.18E-09	1.83E-08
3-Methylchloranthrene	1.80E-06	3.13E-10	1.37E-09
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.79E-09	1.22E-08
Acenaphthene	1.80E-06	3.13E-10	1.37E-09
Acenaphthylene	1.80E-06	3.13E-10	1.37E-09
Anthracene	2.40E-06	4.18E-10	1.83E-09
Benz(a)anthracene	1.80E-06	3.13E-10	1.37E-09
Benzene	2.10E-03	3.66E-07	1.60E-06
Benzo(a)pyrene	1.20E-06	2.09E-10	9.15E-10
Benzo(b)fluoranthene	1.80E-06	3.13E-10	1.37E-09
Benzo(g,h,i)perylene	1.20E-06	2.09E-10	9.15E-10
Benzo(k)fluoranthene	1.80E-06	3.13E-10	1.37E-09
Chrysene	1.80E-06	3.13E-10	1.37E-09
Dibenzo(a,h)anthracene	1.20E-06	2.09E-10	9.15E-10
Dichlorobenzene	1.20E-03	2.09E-07	9.15E-07
Fluoranthene	3.00E-06	5.22E-10	2.29E-09
Fluorene	2.80E-06	4.87E-10	2.14E-09
Formaldehyde	7.50E-02	1.31E-05	5.72E-05
Hexane	1.80E+00	3.13E-04	1.37E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	3.13E-10	1.37E-09
Naphthalene	6.10E-04	1.06E-07	4.65E-07
Phenanathrene	1.70E-05	2.96E-09	1.30E-08
Pyrene	5.00E-06	8.70E-10	3.81E-09
Toluene	3.40E-03	5.92E-07	2.59E-06
Heater Total HAPs (tpy)			**1.44E-03**

1. Emission factors from AP-42, Chapter 1.4, Table 1.4-3 (7/98).

2. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMscf) * (Flow Rate, MMscf/yr) / (Operating Hours per Year, hr/yr).

3. Annual Emission Rate (tpy) = (Average Hourly Emission Rate, lb/hr) * (8,760 hr/yr) / (2,000 lb/ton).

Targa Badlands LLC - Robert's Trust Compressor Station
GLYCOL DEHYDRATOR POLLUTANT EMISSIONS (EU 17/EPN 17)

Component	GlyCalc Uncontrolled Regenerator Emissions lbs/hr[1]	GlyCalc Uncontrolled Flash Tank Emissions lbs/hr[1]	GlyCalc Uncontrolled Regenerator Emissions tpy	GlyCalc Uncontrolled Flash Tank Emissions tpy[2]
Methane	0.0434	1.7272	0.1901	7.5651
Ethane	0.1982	2.9608	0.8681	12.9683
Propane	0.3666	2.7434	1.6057	12.0161
Isobutane	0.0624	0.3744	0.2733	1.6399
n-butane	0.2603	1.3029	1.1401	5.7067
Isopentane	0.0332	0.1702	0.1454	0.7455
n-Pentane	0.0575	0.2510	0.2519	1.0994
n-Hexane	0.0139	0.0411	0.0609	0.1800
Cyclohexane	0.0187	0.0152	0.0819	0.0666
other Hexanes	0.0179	0.0666	0.0784	0.2917
Heptanes	0.0301	0.0537	0.1318	0.2352
Methylcyclohexane	0.0144	0.0105	0.0631	0.0460
2,2,4-Trimethypentane	0.0010	0.0032	0.0044	0.0140
Benzene	0.1743	0.0280	0.7634	0.1226
Toluene	0.0613	0.0078	0.2685	0.0342
C8+ Heavies	0.0000	0.0122	0.0000	0.0534
Total Hydrocarbon Emissions	1.3532	9.7682	5.9270	42.7847
Total VOC Emissions	1.1116	5.0802	4.8688	22.2513
Total HAP Emissions	0.2505	0.0801	1.0972	0.3508

1. Hourly emissions from GRI-GLYCalc Version 4.0
2. Annual emissions (tpy) = emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

MACT HH Applicability
0.89 tpy Total Benzene

Yes — If the site is an area source, is 1 tpy exemption met?

GHG Calcs			
CO_2[1] (tn/yr)	CH_4 (tn/yr)	N_2O (tn/yr)	CO_2e (tn/yr)
2.827	7.565	0.000	191.955

1. CO_2 emissions from flash tank off gas stream, regenerator overheads stream. Methane emissions from uncontrolled regenerator emissions and flash tank off gas.

Targa Badlands LLC - Robert's Trust Compressor Station
Loading Loss Emission Calculations

Equation[1]:

$$L_L = 12.46 * \frac{SPM}{T}$$

Variables[1]:

L_L - Loading Loss (lbs/1000 gal loaded)
S - Saturation Factor (From Table 5.2-1 of AP-42, Section 5.2)
P - True Vapor Pressure of Loaded Liquid (psia)
M - Molecular Weight of Vapor (lb/lb mol)
T- Temperature of Bulk Liquid (°R = [°F + 460])

Robert's Trust Compressor Station Loading Data (EU 20/EPN 20, EU 22/EPN 22)

EU	Material Loaded	Loading Method	S	P_{max}[2] (psia)	M (lb/lbmol)	T[3] (°R)	L_L (lbs/1000 gal)	Max Hourly Throughput[4] (gal/hr)	Max Hourly Emissions[5] (lb/hr)
20	Produced Water	Submerged	0.60	13.85	60.8	500.67	12.5819	10,500	2.80
22	Condensate	Submerged	0.60	13.85	60.9	500.22	12.5991	10,500	132.29

EU	Material Loaded	Loading Method	S	P_{max}[2] (psia)	M (lb/lbmol)	T[3] (°R)	L_L (lbs/1000 gal)	Total Annual Throughput[4] (gallons/yr)	Annual Emissions[5] (tpy)
20	Produced Water	Submerged	0.60	13.85	60.8	500.67	12.5819	868,061	0.12
22	Condensate	Submerged	0.60	13.85	60.9	500.22	12.5991	3,986,413	25.11

1. Loading Loss Equation and Variables are from AP-42, Chapter 5.2 (6/08).
2. The vapor pressure for the maximum hourly and annual average emission rate is based on the bubble point pressure from the ProMax files run 7/2018. As only an annual analysis was completed, hourly pressure assumed equal to annual pressure.
3. Temperature from ProMax files run 7/2018. As only an annual analysis was completed, hourly temperature assumed equal to annual pressure.
4. The maximum hourly throughput is based on the loading of one 250 barrel tank truck in one-hour. The total annual throughput is based on the total annual throughput for condensate and produced water storage tanks.
5. Loading emissions for produced water were calculated using the properties of pure condensate and multiplying by a factor of 1% to account for the condensate in the produced water.

Components	Condensate Vapor Weight %[1]	Hourly Condensate Loading Losses[2] (lb/hr)	Annual Condensate Loading Losses[2] (tpy)	PW Vapor Weight %[1]	Hourly PW Loading Losses[2] (lb/hr)	Annual PW Loading Losses[2] (tpy)
2,2,4-TMP	0.19%	0.25	0.05	0.19%	5.29E-03	2.19E-04
Benzene	0.17%	0.23	0.04	0.17%	4.85E-03	2.01E-04
Ethylbenzene	0.01%	0.02	3.50E-03	0.01%	3.90E-04	1.61E-05
n-Hexane	3.75%	4.96	0.94	3.75%	0.10	4.34E-03
Toluene	0.15%	0.20	3.85E-02	0.15%	4.29E-03	1.77E-04
m-Xylene	0.00%	0.00	8.36E-04	0.00%	9.32E-05	3.85E-06
p-Xylene	0.02%	0.02	3.89E-03	0.02%	4.34E-04	1.79E-05
o-Xylene	0.00%	0.00	6.75E-04	0.00%	7.52E-05	3.11E-06
Total HAP	4.30%	5.69	1.08	4.30%	0.12	4.97E-03

1. Vapor weight percent based on working and breathing losses.
2. Total HAP calculated by multiplying the vapor weight % of each constituent by the total hourly or annual throughputs of condensate and produced water.

Targa Badlands LLC - Robert's Trust Compressor Station
Vapor Combuster Emission Calculations

Total Emissions from VCU (EU 23/EPN 23)[1]		
Pollutant	**(lb/hr)**	**(tpy)**
NO_x	0.02	0.11
CO	0.11	0.50
SO_2	2.61E-05	1.15E-04
VOC	0.56	2.47
HAPs	0.02	0.08

1. Total emissions from the vapor combustor include emissions from the combustion of pilot gas, combustion of gas vented from the condensate (EU 21, 33, 34) and produced water tank (EU 19) and VOCs from uncombusted vent gas.

Calculations of Tank Vent Gas Emissions			
Parameters [1]	**Hourly Value**	**Annual Value**	**Unit**
Vapor MW	41.32	41.32	lb/lb-mol
Net Heating Value	1,946.71	1,946.71	btu/scf
Gross Heating Value	2,116.10	2,116.10	btu/scf
Vapor Volumetric Flow [2]	107.09	107.09	scfh
VOC Destruction Efficiency	95.00		%

Calculations of Produced Water Tank Vent Gas Emissions			
Parameters [1]	**Hourly Value**	**Annual Value**	**Unit**
Vapor MW	41.32	41.32	lb/lb-mol
Net Heating Value	1,946.71	1,946.71	btu/scf
Gross Heating Value	2,116.10	2,116.10	btu/scf
Vapor Volumetric Flow [2]	32.08	32.08	scfh
VOC Destruction Efficiency	0.00		%

Pollutant	**Emission Factor (lb/MMbtu)**	**Hourly Emissions (lb/hr)**	**Annual Emissions (tpy)**
NOx [3, 4]	0.068	0.02	0.09
CO [3, 4]	0.31	0.09	0.40
VOC [5]	--	0.51	2.24

HAP Emissions from VCU [6]	**Hourly Emissions (lb/hr)**	**Annual Emissions (tpy)**
2,2,4-TMP	8.60E-04	3.44E-04
Benzene	9.51E-04	4.17E-03
Ethylbenzene	7.24E-05	2.81E-04
n-Hexane	1.73E-02	6.92E-02
Toluene	8.12E-04	3.25E-03
Xylenes	1.11E-04	4.43E-04
Total HAPs [6]	**0.02**	**0.08**

1. Vapor MW, heating values, and vapor volumetric flow are obtained from the ProMax output for the condensate and produced water tanks.
2. The volumetric flow for flash losses is calculated by summing the vapor volumetric flow for the vapor stream from the ProMax files and the working and breathing losses, converted to cubic feet per hour. Vapor volumetric
3. Emission Factors from AP-42 Table 13.5-1, Chapter 13.5 (Industrial Flares, 2/18).
4. Emissions are calculated as (Emission Factor)*(Gross Heating Value)*(Vapor Volumetric Flow)/(1,000,000 Btu/MMBtu). Annual emissions are converted to tons per year.
5. VOC emissions are calculated based on ProMax outputs and are calculated as [(Working and Breathing Losses)+(Flash Losses)]*(1-95% control efficiency) from the condensate tank, and 0% for the produced water tank.
6. HAP hourly and annual emissions based off condensate ProMax results and VOC destruction efficiency.

Calculations of Pilot Gas Combustion Emissions		
VCU Information[1]		
VOC DRE [1]	95	%
Pilot Gas Flow [1]	50	SCFH
Heat Content [2]	1,436	Btu/scf

Pollutant	Emission Factor [3]		Emissions (lb/hr)	Emissions (tpy)
NO_X [4]	0.068	lb/MMBtu	4.88E-03	0.02
CO [4]	0.31	lb/MMBtu	0.02	0.10

1. Information from vendor specification sheet.
2. Heat Content from fuel gas analysis.
3. Emission Factors from AP-42 Table 13.5-1, Chapter 13.5 (Industrial Flares, 2/18) and AP-42 Table 1.4-3, Chapter 1.4 (Natural Gas Combustion, 7/98).
4. Emissions calculated as (Emission Factor)(Pilot Gas Heat Content)(Pilot gas Flow)(1 MMBtu/ 1,000,000 Btu). Annual emission include conversion factors to convert to tons per year.

Calculations of Pilot Gas VOC Emissions

$$M=\frac{60(MW)PV}{RT}$$

Where *m=mass flow rate in lb/hr*
MW=molecular weight in lb/lbmole
P=standard pressure=14.7 psia
V=flow rate in scfm
R=gas constant=10.73 psia · ft^3 · $lbmol^{-1}$ · $^oR^{-1}$, and
T=standard temperature=528°R

Constituent[1]	Federal HAP?	Molecular Weight (lb/lb-mole)	Mole %[1] (%)	Volume Flow Rate (scf/hr)	Mass Flow Rate (lb/hr)	Pilot Gas Emissions (lb/hr)	Pilot Gas Emissions (tpy)
Methane	No	16.043	57.06%	28.53	1.19	5.94E-02	2.60E-01
Ethane	No	30.070	22.21%	11.11	0.87	4.33E-02	1.90E-01
Propane	No	44.097	11.50%	5.75	0.66	3.29E-02	1.44E-01
i-Butane	No	58.123	1.07%	0.54	0.08	4.04E-03	1.77E-02
n-Butane	No	58.123	2.82%	1.41	0.21	1.06E-02	4.66E-02
i-Pentane	No	72.150	0.43%	0.22	0.04	2.03E-03	8.89E-03
n-Pentane	No	72.150	0.35%	0.17	0.03	1.63E-03	7.12E-03
n-Hexane (hexanes +)[2]	Yes	86.177	0.12%	0.06	1.31E-02	6.53E-04	2.86E-03
n-Heptane	No	100.210	0.00%	--	--	--	--
H_2O	No	18.015	0.00%	--	--	--	--
CO_2	No	44.010	0.72%	0.36	0.04	2.06E-03	9.02E-03
N_2	No	28.013	3.72%	1.86	0.14	6.76E-03	2.96E-02
					Total Emissions	1.63E-01	7.16E-01
					Total VOC Emissions	5.19E-02	2.27E-01
					Total HAP Emissions[2]	6.53E-04	2.86E-03

1. Constituents and Mol % from fuel gas analysis dated 07/22/2015.
2. Total HAP Emissions are conservatively assumed to be n-Hexane (hexanes +).

Calculations of Pilot Gas SO_2 Emissions

SO_2 is based on a material balance with 100% flare efficiency and a maximum 4 ppm fuel Sulfur content.

Gas Stream	Flare Efficiency Fraction	Fuel Burned (lbs/hr)	SO_2 [1] (lb/hr)	SO_2 [1] (TPY)
Fuel Gas	1.00	3.27	2.61E-05	1.15E-04

1. Emissions calculated are equal to (Flare Efficiency Fraction)*(Pilot Fuel Burned)*(Fuel Sulfur Content)*(Mole Wt. of SO2)/(Mole Wt. of Sulfur). Annual emission are converted to tons per year.

Calculations of GHG Emissions

	Hourly (MMBtu/hr)	Annual Average (MMBtu/hr)
Total Heat Content [1]	0.37	0.37

Pollutant	Emission Factor [2] lb/MMBtu	GWPs [3]	Emission Rate [4] lb/hr	tpy
CO_2	142.79	1	52.31	229.11
CH_4	6.61E-03	25	2.42E-03	0.01
N_2O	1.32E-03	298	4.85E-04	2.12E-03
Total CO_2e			52.51	230.00

1. Total heat content is calculated by multiplying the pilot fuel gas heat content by the pilot gas fuel flow and adding the tank vent gas heat content multiplied by the tank vent gas flow.
2. GHG emission factors from 40 CFR 98 Table C-1 for butane and 40 CFR 98 Table C-2 for Petroleum (All fuel types in Table C-1).
3. Global Warming Potentials (GWPs) from 40 CFR 98 Table A-1.

Targa Badlands LLC - Robert's Trust Compressor Station
Fugitive Emissions Calculations

Robert's Trust Compressor Station Fugitives Data (EU 24/FUG)							VOC/HAPs													
							VOC			2,2,4-TMP			Benzene			Ethylbenzene			Methanol		
Service	Service Type	Equipment Type [1]	Emission Factors [1] (kg/hr/source)	Count [2]	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	(wt %)	(lb/hr) [3]	(tpy) [4]	(wt %)	(lb/hr) [3]	(tpy) [4]	(wt %)	(lb/hr) [3]	(tpy) [4]	(wt %)	(lb/hr) [3]	(tpy) [4]	(wt %)	(lb/hr) [3]	(tpy) [4]
Gas	Field gas [5]	Valves	4.50E-03	183	1.82	7.95	39.31%	1.11	4.86	0.11%	3.06E-03	0.01	0.04%	1.25E-03	5.46E-03	0.00%	7.05E-05	3.09E-04	0.00%	-	-
		Pump Seals	2.40E-03	18	0.10	0.42															
		Others	6.80E-03	26	0.50	2.21															
		Flanges / Connectors	3.90E-04	348	0.30	1.31															
		Open-Ended	2.00E-03	24	0.11	0.46															
		Total Field Gas			**2.82**	**12.35**															
Light Oil	Condensate [6]	Valves	2.50E-03	33	0.19	0.80	99.60%	0.57	2.48	1.89%	0.01	0.05	0.89%	5.04E-03	0.02	0.77%	4.37E-03	0.02	0.00%	-	-
		Pump Seals	1.30E-02	3	0.09	0.38															
		Others	7.50E-03	15	0.25	1.09															
		Flanges / Connectors	2.10E-04	72	0.03	0.15															
		Open-Ended	1.40E-03	6	0.02	0.08															
		Total Condensate			**0.57**	**2.49**															
	Methanol [7]	Valves	2.50E-03	31	0.17	0.75	100.00%	0.22	0.96	0.00%	-	-	0.00%	-	-	0.00%	-	-	100.00%	0.22	0.96
		Pump Seals	1.30E-02	0	-	-															
		Others	7.50E-03	0	-	-															
		Flanges / Connectors	2.10E-04	102	0.05	0.21															
		Open-Ended	1.40E-03	0	-	-															
		Total Methanol			**0.22**	**0.96**															
Oil/Water	Produced Water [8]	Valves	9.80E-05	51	0.01	0.05	2.12%	1.58E-03	6.90E-03	0.04%	2.99E-05	1.31E-04	0.02%	1.40E-05	6.14E-05	0.02%	1.22E-05	5.33E-05	0.00%	-	-
		Pump Seals	2.40E-05	0	-	-															
		Others	1.40E-02	0	-	-															
		Flanges / Connectors	1.10E-04	261	0.06	0.28															
		Open-Ended	2.50E-04	0	-	-															
		Total Produced Water			**0.07**	**0.33**															
Heavy Oil	Triethylene Glycol (TEG) [8]	Valves	8.40E-06	24	4.44E-04	1.95E-03	100.00%	2.05E-03	8.99E-03	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-
		Pump Seals	NA	0	-	-															
		Others	3.20E-05	5	3.39E-04	1.49E-03															
		Flanges / Connectors	7.50E-06	77	1.27E-03	5.56E-03															
		Open-Ended	1.40E-04	0	-	-															
		Total TEG			**2.05E-03**	**8.99E-03**															
Crude Oil (Pumping Station)	Crude Oil (Light Oil)	Valves	2.50E-03	100	0.55	2.41	99.83%	1.21	5.32	1.43%	0.02	0.08	0.42%	5.12E-03	0.02	0.42%	5.08E-03	0.02	0.00%	-	-
		Pump Seals	1.30E-02	0	-	-															
		Others	7.50E-03	34	0.56	2.46															
		Flanges / Connectors	2.10E-04	224	0.10	0.45															
		Open-Ended	1.40E-03	0	-	-															
		Total Crude Oil			**1.22**	**5.33**															
					Emission Totals			**3.11**	**13.63**	-	**0.03**	**0.14**	-	**0.01**	**0.05**	-	**9.52E-03**	**0.04**	-	**0.22**	**0.96**

1. Emission factors are from Table 2-4 of the "Protocol for Equipment Leak Emission Estimates". EPA-453/R-95-017
2. Component counts are estimated using facility piping diagrams. Flanges and connectors are grouped together and utilize the worst-case emission factor for flanges or connectors for each service.
3. Hourly Emission Rate (lb/hr) = (Emission Factor, kg/hour/source) * (count) * (1000 kg/g) / (453.59 g/lb) * (wt %).
4. Annual Emission Rate (tpy) = (Hourly Emission Rate, lb/hr) * (hr/yr) / (2,000 lb/ton).
5. Field gas composition obtained from inlet gas analysis performed 6/14/2013.
6. Condensate stream and produced water speciation based on facility ProMax results, ran 7/2018.
7. Light oil methanol stream assumed to be 100% methanol/VOC
8. Triethylene glycol stream assumed to be 100% VOC.

									GHGs							
n-Hexane			Toluene			Xylene			Methane			CO_2			CO_2e	
(wt %)	(lb/hr)[3]	(tpy)[4]	(wt %)	(lb/hr)[3]	(tpy)[4]	(wt %)	(lb/hr)[3]	(tpy)[4]	(wt %)	(lb/hr)[3]	(tpy)[4]	(wt %)	(lb/hr)[3]	(tpy)[4]	(lb/hr)[3]	(tpy)[4]
0.58%	0.02	0.07	0.02%	5.41E-04	2.37E-03	0.01%	1.69E-04	7.41E-04	31.86%	0.90	3.94	1.07%	0.03	0.13	22.49	98.52
11.69%	0.07	0.29	2.77%	0.02	0.07	1.34%	7.59E-03	0.03	0.02%	1.25E-04	5.47E-04	0.00%	-	-	0.31%	1.37%
0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	0.00%
0.25%	1.85E-04	8.10E-04	0.06%	4.39E-05	1.92E-04	0.03%	2.11E-05	9.26E-05	0.00%	3.48E-07	1.52E-06	0.00%	-	-	0.00%	0.00%
0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	-	-	0.00%	0.00%
3.48%	0.04	0.19	0.75%	9.13E-03	0.04	1.63%	0.02	0.09	0.00%	4.62E-05	2.03E-04	0.00%	-	-	0.12%	0.51%
-	0.13	0.55	-	0.03	0.11	-	0.03	0.12	-	0.90	3.94	-	0.03	0.13	22.50	98.53

Targa Badlands LLC - Robert's Trust Compressor Station
Glycol Reboiler Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Reboiler Data (EU 25/ EPN 25)		
Emission Source	Glycol Reboiler	
Source Type	Natural Gas Fired Heater	
Heat Input	0.68	MMBtu/hr
Flow Rate	470.06	scf/hr
Flow Rate	4.12	MMscf/yr
Estimated HHV	1,436.00	Btu/scf
Sulfur Content of Fuel	0.0020	gr/scf
Operating Hours per Year	8,760	hr/yr

Pollutant	Emission Factors[1]		Emission Rates	
			Hourly[2,3] (lb/hr)	Annual[4] (tpy)
NO_x	100	lb/MMscf	0.05	0.21
CO	84	lb/MMscf	0.04	0.17
VOC	5.5	lb/MMscf	2.59E-03	0.01
SO_2	3.98E-04	lb/MMBtu	2.68E-04	1.18E-03
PM_{10}	7.6	lb/MMscf	3.57E-03	0.02
$PM_{2.5}$	7.6	lb/MMscf	3.57E-03	0.02

1. Emission factors are from AP-42, Chapter 1.4, Tables 1.4-1 & 2 (7/98) for small boilers. SO_2 emissions based on AP-42, Chapter 1.4, Table 1.4-2 (7/98), which is based on 2,000 grains/MMscf and 100% conversion to SO_2.
2. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMscf) * (Flow rate, MMscf/yr) / (Operating Hours per Year, hr/yr).
3. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMBtu) * (Heat Input, MMBtu/hr).
4. Annual Emission Rate (tpy) = (Hourly Emission Rate, lb/hr) * (Operating Hours per Year, hr/yr) / (2,000 lb/ton).

Targa Badlands LLC - Robert's Trust Compressor Station
Glycol Reboiler Hazardous Air Pollutant Emissions Calculations

Robert's Trust Compressor Station Reboiler Data (EU 25/EPN 25)		
Emission Source	Glycol Reboiler	
Source Type	Natural Gas Fired Heater	
Heat Input	0.68	MMBtu/hr
Flow Rate	470.06	scf/hr
Flow Rate	4.12	MMscf/yr
Estimated HHV	1,436.00	Btu/scf
Sulfur Content of Fuel	0.0020	gr/scf
Operating Hours per Year	8,760	hr/yr

Pollutant	Emission Factors [1] (lb/MMscf)	Emission Rates [2,3] (lb/hr)	(tpy)
2-Methylnaphthalene	2.40E-05	1.13E-08	4.94E-08
3-Methylchloranthrene	1.80E-06	8.46E-10	3.71E-09
7,12-Dimethylbenz(a)anthracene	1.60E-05	7.52E-09	3.29E-08
Acenaphthene	1.80E-06	8.46E-10	3.71E-09
Acenaphthylene	1.80E-06	8.46E-10	3.71E-09
Anthracene	2.40E-06	1.13E-09	4.94E-09
Benz(a)anthracene	1.80E-06	8.46E-10	3.71E-09
Benzene	2.10E-03	9.87E-07	4.32E-06
Benzo(a)pyrene	1.20E-06	5.64E-10	2.47E-09
Benzo(b)fluoranthene	1.80E-06	8.46E-10	3.71E-09
Benzo(g,h,i)perylene	1.20E-06	5.64E-10	2.47E-09
Benzo(k)fluoranthene	1.80E-06	8.46E-10	3.71E-09
Chrysene	1.80E-06	8.46E-10	3.71E-09
Dibenzo(a,h)anthracene	1.20E-06	5.64E-10	2.47E-09
Dichlorobenzene	1.20E-03	5.64E-07	2.47E-06
Fluoranthene	3.00E-06	1.41E-09	6.18E-09
Fluorene	2.80E-06	1.32E-09	5.76E-09
Formaldehyde	7.50E-02	3.53E-05	1.54E-04
Hexane	1.80E+00	8.46E-04	3.71E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	8.46E-10	3.71E-09
Naphthalene	6.10E-04	2.87E-07	1.26E-06
Phenanathrene	1.70E-05	7.99E-09	3.50E-08
Pyrene	5.00E-06	2.35E-09	1.03E-08
Toluene	3.40E-03	1.60E-06	7.00E-06
Heater Total HAPs		**8.85E-04**	**3.88E-03**

1. Emission factors from AP-42, Chapter 1.4, Table 1.4-3 (7/98).

2. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMscf) * (Flow Rate, MMscf/yr) / (Operating Hours per Year, hr/yr).

3. Annual Emission Rate (tpy) = (Average Hourly Emission Rate, lb/hr) * (8,760 hr/yr) / (2,000 lb/ton).

Targa Badlands LLC - Robert's Trust Compressor Station
GLYCOL DEHYDRATOR POLLUTANT EMISSIONS (EU 26/EPN 26)

Component	GlyCalc Uncontrolled Regenerator Emissions [1] (lb/hr)	GlyCalc Uncontrolled Flash Tank Emissions [1] (lb/hr)	Total Hourly Emissions (lb/hr)	GlyCalc Uncontrolled Regenerator Emissions [1] (tpy)	GlyCalc Uncontrolled Flash Tank Emissions [1] (tpy)	Total Annual Emissions (tpy)
Methane	0.04	1.58	1.61	0.16	6.91	7.07
Ethane	0.15	2.63	2.78	0.65	11.53	12.17
Propane	0.34	2.62	2.96	1.50	11.46	12.96
Isobutane	0.06	0.35	0.41	0.24	1.54	1.78
n-butane	0.23	1.23	1.46	1.01	5.38	6.39
Isopentane	0.03	0.16	0.19	0.12	0.69	0.82
n-Pentane	0.05	0.23	0.28	0.21	1.03	1.24
n-Hexane	0.01	0.04	0.05	0.05	0.17	0.22
Cyclohexane	0.01	0.01	0.03	0.06	0.06	0.13
Other Hexanes	0.01	0.06	0.08	0.06	0.27	0.33
Heptanes	0.02	0.05	0.07	0.10	0.22	0.32
Methylcyclohexane	0.01	0.01	0.02	0.05	0.05	0.09
2,2,4-Trimethypentane	7.00E-04	2.80E-03	3.50E-03	3.00E-03	0.01	0.02
Benzene	0.16	0.03	0.19	0.71	0.12	0.84
Toluene	0.06	8.10E-03	0.06	0.24	0.04	0.28
C8+ Heavies	-	9.90E-03	9.90E-03	-	0.04	0.04
Total Hydrocarbon Emissions	1.18	9.02	10.20	5.16	39.52	44.69
Total VOC Emissions	1.00	4.81	5.81	4.36	21.08	25.44
Total HAP Emissions	0.23	0.08	0.31	1.01	0.34	1.35

1. Hourly emissions from GRI-GLYCalc Version 4.0

GHG Calcs				
	CO_2	CH_4	N_2O	CO_2e
lb/hr	0.72	1.61	-	41.09
tpy	3.17	7.07	-	179.98

1. CO_2 emissions from flash tank off gas stream, regenerator overheads stream. Methane emissions from uncontrolled regenerator emissions and flash tank off gas.

MACT HH Applicability	
0.84	tpy Total Benzene
Yes	If the site is an area source, is 1 tpy exemption met?

Targa Badlands LLC - Robert's Trust Compressor Station
IC Engine Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 27/EPN 27)					
IC Engine Make	Waukesha		Higher Heating Value [1]	1,436.00	Btu/scf
IC Engine Model	L5794GSI		Lower Heating Value [1]	1,308.00	Btu/scf
Power Rating[1]	1,380	bhp	Sulfur Content	0.0020	gr/scf
Heat Rate [1]	7,645	Btu/bhp-hr	Fuel Consumption	8,065.83	scf/hr
Duty (input)	10.55	MMBtu/hr	Fuel Consumption	70.66	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	181	m^3/min

Pollutant	Emission Factors[1,2]		Emission Rates (lb/hr)	Emission Rates (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ Table 1
VOC[3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2[4]	5.88E-04	lb/MMBtu	6.20E-03	2.72E-02	AP42 Tbl 3.2-3; 4SRB
PM_{10}[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
$PM_{2.5}$[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
TSP[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
Acetaldehyde	9.67E-03	g/bhp-hr	2.94E-02	0.13	AP42 Tbl 3.2-3; 4SRB
Acrolein	9.12E-03	g/bhp-hr	2.77E-02	0.12	AP42 Tbl 3.2-3; 4SRB
Benzene	5.48E-03	g/bhp-hr	1.67E-02	0.07	AP42 Tbl 3.2-3; 4SRB
Total HAPS			0.28	1.22	AP42 Tbl 3.2-3; 4SRB

Pollutant	Emission Factors[1,2]		Emission Rates (lb/hr)	Emission Rates (tpy)	Source of Emission Factors
CO_2	473	g/bhp-hr	1,439.05	6,303.05	Manufacturer
Methane	1.55	g/bhp-hr	4.72	20.65	Manufacturer
N_2O	1.00E-04	kg/MMBtu	1.06E-03	4.62E-03	40 CFR Part 98 Table C-2
CO_2e	-	-	1,557.26	6,820.80	40 CFR 98 Table A-1

Sample Calcs:

(bhp) (Btu/bhp-hr) ($MM/10^6$) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr.

(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr.

(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr.

1. Horsepower, heat rate, fuel heating values, exhaust flow rate, and formaldehyde emission factor from manufacturer spec sheet. Emission factors for NO_x, CO, and VOC from NSPS JJJJ Table 1.
2. Emission factors for HAPs (other than formaldehyde) based on AP-42, Chapter 3.2, Table 3.2-3 (7/00).
3. VOC Emission Factor calculated by summing VOC from NSPS JJJJ and formaldehyde value from the manufacturer spec sheet.
4. SO_2 emissions based on AP-42, Chapter 3.2, Table 3.2-3 (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf.
5. Emission factor for PM_{10} & $PM_{2.5}$ from AP-42, Chapter 3.2, Table 3.2-3 (7/00), including $PM_{10}/PM_{2.5}$ filterable (9.50-03 lb/MMBtu) & PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

Targa Badlands LLC - Robert's Trust Compressor Station
IC Engine Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 28/EPN 28)					
IC Engine Make	Waukesha		Higher Heating Value [1]	1,436.00	Btu/scf
IC Engine Model	L5794GSI		Lower Heating Value [1]	1,308.00	Btu/scf
Power Rating[1]	1,380	bhp	Sulfur Content	0.0020	gr/scf
Heat Rate [1]	7,645	Btu/bhp-hr	Fuel Consumption	8,065.83	scf/hr
Duty (input)	10.55	MMBtu/hr	Fuel Consumption	70.66	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	181	m^3/min

Pollutant	Emission Factors[1,2]		Emission Rates (lb/hr)	Emission Rates (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ Table 1
VOC[3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2[4]	5.88E-04	lb/MMBtu	6.20E-03	2.72E-02	AP42 Tbl 3.2-3; 4SRB
PM_{10}[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
$PM_{2.5}$[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
TSP[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
Acetaldehyde	9.67E-03	g/bhp-hr	2.94E-02	0.13	AP42 Tbl 3.2-3; 4SRB
Acrolein	9.12E-03	g/bhp-hr	2.77E-02	0.12	AP42 Tbl 3.2-3; 4SRB
Benzene	5.48E-03	g/bhp-hr	1.67E-02	0.07	AP42 Tbl 3.2-3; 4SRB
Total HAPS			0.28	1.22	AP42 Tbl 3.2-3; 4SRB

Sample Calcs:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr.

(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr.

(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr.

1. Horsepower, heat rate, fuel heating values, exhaust flow rate, and formaldehyde emission factor from manufacturer spec sheet. Emission factors for NO_x, CO, and VOC from NSPS JJJJ Table 1.
2. Emission factors for HAPs (other than formaldehyde) based on AP-42, Chapter 3.2, Table 3.2-3 (7/00).
3. VOC Emission Factor calculated by summing VOC from NSPS JJJJ and formaldehyde value from the manufacturer spec sheet.
4. SO_2 emissions based on AP-42, Chapter 3.2, Table 3.2-3 (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf.
5. Emission factor for PM_{10} & $PM_{2.5}$ from AP-42, Chapter 3.2, Table 3.2-3 (7/00), including $PM_{10}/PM_{2.5}$ filterable (9.50-03 lb/MMBtu) & PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP EMISSIONS

HAP Compounds	AP-42 Emission Factor (lb/MMBtu)	Emission Factor[1] (g/hp-hr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
CH_2O		0.05	0.15	0.67
1,1,2,2-Tetrachloroethane	2.53E-05	8.77E-05	2.67E-04	1.17E-03
1,1,2-Trichloroethane	1.53E-05	5.31E-05	1.61E-04	7.07E-04
1,3-Butadiene	6.63E-04	2.30E-03	6.99E-03	0.03
1,3-Dichloropropene	1.27E-05	4.40E-05	1.34E-04	5.87E-04
Acetaldehyde	2.79E-03	9.67E-03	0.03	0.13
Acrolein	2.63E-03	9.12E-03	0.03	0.12
Benzene	1.58E-03	5.48E-03	0.02	0.07
Carbon Tetrachloride	1.77E-05	6.14E-05	1.87E-04	8.18E-04
Chlorobenzene	1.29E-05	4.47E-05	1.36E-04	5.96E-04
Chloroform	1.37E-05	4.75E-05	1.45E-04	6.33E-04
Ethylbenzene	2.48E-05	8.60E-05	2.62E-04	1.15E-03
Ethylene Dibromide	2.13E-05	7.39E-05	2.25E-04	9.84E-04
Methanol	3.06E-03	0.01	0.03	0.14
Methylene Chloride	4.12E-05	1.43E-04	4.35E-04	1.90E-03
Naphthalene	9.71E-05	3.37E-04	1.02E-03	4.49E-03
PAH	1.41E-04	4.89E-04	1.49E-03	6.52E-03
Styrene	1.19E-05	4.13E-05	1.26E-04	5.50E-04
Toluene	5.58E-04	1.93E-03	5.89E-03	0.03
Vinyl Chloride	7.18E-06	2.49E-05	7.58E-05	3.32E-04
Xylene	1.95E-04	6.76E-04	2.06E-03	9.01E-03
TOTAL HAP EMISSIONS			**0.28**	**1.22**

[1] Emission Factors derived from AP-42 Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES. Formaldehyde (CH2O) emission factor from manufacturer specification sheet.

Targa Badlands LLC - Robert's Trust Compressor Station
IC Engine Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 29/EPN 29)					
IC Engine Make	Waukesha		Higher Heating Value [1]	1,436.00	Btu/scf
IC Engine Model	L5794GSI		Lower Heating Value [1]	1,308.00	Btu/scf
Power Rating[1]	1,380	bhp	Sulfur Content	0.0020	gr/scf
Heat Rate [1]	7,645	Btu/bhp-hr	Fuel Consumption	8,065.83	scf/hr
Duty (input)	10.55	MMBtu/hr	Fuel Consumption	70.66	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	181	m^3/min

Pollutant	Emission Factors[1,2]		Emission Rates (lb/hr)	Emission Rates (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ Table 1
VOC[3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2[4]	5.88E-04	lb/MMBtu	6.20E-03	2.72E-02	AP42 Tbl 3.2-3; 4SRB
PM_{10}[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
$PM_{2.5}$[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
TSP[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
Acetaldehyde	9.67E-03	g/bhp-hr	2.94E-02	0.13	AP42 Tbl 3.2-3; 4SRB
Acrolein	9.12E-03	g/bhp-hr	2.77E-02	0.12	AP42 Tbl 3.2-3; 4SRB
Benzene	5.48E-03	g/bhp-hr	1.67E-02	0.07	AP42 Tbl 3.2-3; 4SRB
Total HAPS			0.28	1.22	AP42 Tbl 3.2-3; 4SRB

Sample Calcs:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr.

(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr.

(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr.

1. Horsepower, heat rate, fuel heating values, exhaust flow rate, and formaldehyde emission factor from manufacturer spec sheet. Emission factors for NO_x, CO, and VOC from NSPS JJJJ Table 1.
2. Emission factors for HAPs (other than formaldehyde) based on AP-42, Chapter 3.2, Table 3.2-3 (7/00).
3. VOC Emission Factor calculated by summing VOC from NSPS JJJJ and formaldehyde value from the manufacturer spec sheet.
4. SO_2 emissions based on AP-42, Chapter 3.2, Table 3.2-3 (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf.
5. Emission factor for PM_{10} & $PM_{2.5}$ from AP-42, Chapter 3.2, Table 3.2-3 (7/00), including $PM_{10}/PM_{2.5}$ filterable (9.50-03 lb/MMBtu) & PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP EMISSIONS

HAP Compounds	AP-42 Emission Factor (lb/MMBtu)	Emission Factor[1] (g/hp-hr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
CH_2O		0.05	0.15	0.67
1,1,2,2-Tetrachloroethane	2.53E-05	8.77E-05	2.67E-04	1.17E-03
1,1,2-Trichloroethane	1.53E-05	5.31E-05	1.61E-04	7.07E-04
1,3-Butadiene	6.63E-04	2.30E-03	6.99E-03	0.03
1,3-Dichloropropene	1.27E-05	4.40E-05	1.34E-04	5.87E-04
Acetaldehyde	2.79E-03	9.67E-03	0.03	0.13
Acrolein	2.63E-03	9.12E-03	0.03	0.12
Benzene	1.58E-03	5.48E-03	0.02	0.07
Carbon Tetrachloride	1.77E-05	6.14E-05	1.87E-04	8.18E-04
Chlorobenzene	1.29E-05	4.47E-05	1.36E-04	5.96E-04
Chloroform	1.37E-05	4.75E-05	1.45E-04	6.33E-04
Ethylbenzene	2.48E-05	8.60E-05	2.62E-04	1.15E-03
Ethylene Dibromide	2.13E-05	7.39E-05	2.25E-04	9.84E-04
Methanol	3.06E-03	0.01	0.03	0.14
Methylene Chloride	4.12E-05	1.43E-04	4.35E-04	1.90E-03
Naphthalene	9.71E-05	3.37E-04	1.02E-03	4.49E-03
PAH	1.41E-04	4.89E-04	1.49E-03	6.52E-03
Styrene	1.19E-05	4.13E-05	1.26E-04	5.50E-04
Toluene	5.58E-04	1.93E-03	5.89E-03	0.03
Vinyl Chloride	7.18E-06	2.49E-05	7.58E-05	3.32E-04
Xylene	1.95E-04	6.76E-04	2.06E-03	9.01E-03
TOTAL HAP EMISSIONS			**0.28**	**1.22**

[1] Emission Factors derived from AP-42 Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES. Formaldehyde (CH2O) emission factor from manufacturer specification sheet.

Targa Badlands LLC - Robert's Trust Compressor Station
IC Engine Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 30/EPN 30)					
IC Engine Make	Waukesha		Higher Heating Value [1]	1,436.00	Btu/scf
IC Engine Model	L5794GSI		Lower Heating Value [1]	1,308.00	Btu/scf
Power Rating[1]	1,380	bhp	Sulfur Content	0.0020	gr/scf
Heat Rate [1]	7,645	Btu/bhp-hr	Fuel Consumption	8,065.83	scf/hr
Duty (input)	10.55	MMBtu/hr	Fuel Consumption	70.66	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	181	m^3/min

Pollutant	Emission Factors[1,2]		Emission Rates (lb/hr)	Emission Rates (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ Table 1
VOC[3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2[4]	5.88E-04	lb/MMBtu	6.20E-03	2.72E-02	AP42 Tbl 3.2-3; 4SRB
PM_{10}[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
$PM_{2.5}$[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
TSP[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
Acetaldehyde	9.67E-03	g/bhp-hr	2.94E-02	0.13	AP42 Tbl 3.2-3; 4SRB
Acrolein	9.12E-03	g/bhp-hr	2.77E-02	0.12	AP42 Tbl 3.2-3; 4SRB
Benzene	5.48E-03	g/bhp-hr	1.67E-02	0.07	AP42 Tbl 3.2-3; 4SRB
Total HAPS			0.28	1.22	AP42 Tbl 3.2-3; 4SRB

Sample Calcs:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr.

(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr.

(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr.

1. Horsepower, heat rate, fuel heating values, exhaust flow rate, and formaldehyde emission factor from manufacturer spec sheet. Emission factors for NO_x, CO, and VOC from NSPS JJJJ Table 1.
2. Emission factors for HAPs (other than formaldehyde) based on AP-42, Chapter 3.2, Table 3.2-3 (7/00).
3. VOC Emission Factor calculated by summing VOC from NSPS JJJJ and formaldehyde value from the manufacturer spec sheet.
4. SO_2 emissions based on AP-42, Chapter 3.2, Table 3.2-3 (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf.
5. Emission factor for PM_{10} & $PM_{2.5}$ from AP-42, Chapter 3.2, Table 3.2-3 (7/00), including $PM_{10}/PM_{2.5}$ filterable (9.50-03 lb/MMBtu) & PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP EMISSIONS

HAP Compounds	AP-42 Emission Factor (lb/MMBtu)	Emission Factor[1] (g/hp-hr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
CH_2O		0.05	0.15	0.67
1,1,2,2-Tetrachloroethane	2.53E-05	8.77E-05	2.67E-04	1.17E-03
1,1,2-Trichloroethane	1.53E-05	5.31E-05	1.61E-04	7.07E-04
1,3-Butadiene	6.63E-04	2.30E-03	6.99E-03	0.03
1,3-Dichloropropene	1.27E-05	4.40E-05	1.34E-04	5.87E-04
Acetaldehyde	2.79E-03	9.67E-03	0.03	0.13
Acrolein	2.63E-03	9.12E-03	0.03	0.12
Benzene	1.58E-03	5.48E-03	0.02	0.07
Carbon Tetrachloride	1.77E-05	6.14E-05	1.87E-04	8.18E-04
Chlorobenzene	1.29E-05	4.47E-05	1.36E-04	5.96E-04
Chloroform	1.37E-05	4.75E-05	1.45E-04	6.33E-04
Ethylbenzene	2.48E-05	8.60E-05	2.62E-04	1.15E-03
Ethylene Dibromide	2.13E-05	7.39E-05	2.25E-04	9.84E-04
Methanol	3.06E-03	0.01	0.03	0.14
Methylene Chloride	4.12E-05	1.43E-04	4.35E-04	1.90E-03
Naphthalene	9.71E-05	3.37E-04	1.02E-03	4.49E-03
PAH	1.41E-04	4.89E-04	1.49E-03	6.52E-03
Styrene	1.19E-05	4.13E-05	1.26E-04	5.50E-04
Toluene	5.58E-04	1.93E-03	5.89E-03	0.03
Vinyl Chloride	7.18E-06	2.49E-05	7.58E-05	3.32E-04
Xylene	1.95E-04	6.76E-04	2.06E-03	9.01E-03
TOTAL HAP EMISSIONS			**0.28**	**1.22**

[1] Emission Factors derived from AP-42 Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES. Formaldehyde (CH2O) emission factor from manufacturer specification sheet.

Targa Badlands LLC - Robert's Trust Compressor Station
IC Engine Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 31/EPN 31)					
IC Engine Make	Waukesha		Higher Heating Value [1]	1,436.00	Btu/scf
IC Engine Model	L5794GSI		Lower Heating Value [1]	1,308.00	Btu/scf
Power Rating[1]	1,380	bhp	Sulfur Content	0.0020	gr/scf
Heat Rate [1]	7,645	Btu/bhp-hr	Fuel Consumption	8,065.83	scf/hr
Duty (input)	10.55	MMBtu/hr	Fuel Consumption	70.66	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	181	m^3/min

Pollutant	Emission Factors[1,2]		Emission Rates (lb/hr)	Emission Rates (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ Table 1
VOC[3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2[4]	5.88E-04	lb/MMBtu	6.20E-03	2.72E-02	AP42 Tbl 3.2-3; 4SRB
PM_{10}[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
$PM_{2.5}$[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
TSP[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
Acetaldehyde	9.67E-03	g/bhp-hr	2.94E-02	0.13	AP42 Tbl 3.2-3; 4SRB
Acrolein	9.12E-03	g/bhp-hr	2.77E-02	0.12	AP42 Tbl 3.2-3; 4SRB
Benzene	5.48E-03	g/bhp-hr	1.67E-02	0.07	AP42 Tbl 3.2-3; 4SRB
Total HAPS			0.28	1.22	AP42 Tbl 3.2-3; 4SRB

Sample Calcs:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr.

(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr.

(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr.

1. Horsepower, heat rate, fuel heating values, exhaust flow rate, and formaldehyde emission factor from manufacturer spec sheet. Emission factors for NO_x, CO, and VOC from NSPS JJJJ Table 1.
2. Emission factors for HAPs (other than formaldehyde) based on AP-42, Chapter 3.2, Table 3.2-3 (7/00).
3. VOC Emission Factor calculated by summing VOC from NSPS JJJJ and formaldehyde value from the manufacturer spec sheet.
4. SO_2 emissions based on AP-42, Chapter 3.2, Table 3.2-3 (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf.
5. Emission factor for PM_{10} & $PM_{2.5}$ from AP-42, Chapter 3.2, Table 3.2-3 (7/00), including $PM_{10}/PM_{2.5}$ filterable (9.50-03 lb/MMBtu) & PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP EMISSIONS

HAP Compounds	AP-42 Emission Factor (lb/MMBtu)	Emission Factor[1] (g/hp-hr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
CH_2O		0.05	0.15	0.67
1,1,2,2-Tetrachloroethane	2.53E-05	8.77E-05	2.67E-04	1.17E-03
1,1,2-Trichloroethane	1.53E-05	5.31E-05	1.61E-04	7.07E-04
1,3-Butadiene	6.63E-04	2.30E-03	6.99E-03	0.03
1,3-Dichloropropene	1.27E-05	4.40E-05	1.34E-04	5.87E-04
Acetaldehyde	2.79E-03	9.67E-03	0.03	0.13
Acrolein	2.63E-03	9.12E-03	0.03	0.12
Benzene	1.58E-03	5.48E-03	0.02	0.07
Carbon Tetrachloride	1.77E-05	6.14E-05	1.87E-04	8.18E-04
Chlorobenzene	1.29E-05	4.47E-05	1.36E-04	5.96E-04
Chloroform	1.37E-05	4.75E-05	1.45E-04	6.33E-04
Ethylbenzene	2.48E-05	8.60E-05	2.62E-04	1.15E-03
Ethylene Dibromide	2.13E-05	7.39E-05	2.25E-04	9.84E-04
Methanol	3.06E-03	0.01	0.03	0.14
Methylene Chloride	4.12E-05	1.43E-04	4.35E-04	1.90E-03
Naphthalene	9.71E-05	3.37E-04	1.02E-03	4.49E-03
PAH	1.41E-04	4.89E-04	1.49E-03	6.52E-03
Styrene	1.19E-05	4.13E-05	1.26E-04	5.50E-04
Toluene	5.58E-04	1.93E-03	5.89E-03	0.03
Vinyl Chloride	7.18E-06	2.49E-05	7.58E-05	3.32E-04
Xylene	1.95E-04	6.76E-04	2.06E-03	9.01E-03
TOTAL HAP EMISSIONS			**0.28**	**1.22**

[1] Emission Factors derived from AP-42 Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES. Formaldehyde (CH2O) emission factor from manufacturer specification sheet.

Targa Badlands LLC - Robert's Trust Compressor Station
IC Engine Criteria Pollutant Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 32/EPN 32)					
IC Engine Make	Waukesha		Higher Heating Value [1]	1,436.00	Btu/scf
IC Engine Model	L5794GSI		Lower Heating Value [1]	1,308.00	Btu/scf
Power Rating[1]	1,380	bhp	Sulfur Content	0.0020	gr/scf
Heat Rate [1]	7,645	Btu/bhp-hr	Fuel Consumption	8,065.83	scf/hr
Duty (input)	10.55	MMBtu/hr	Fuel Consumption	70.66	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	181	m^3/min

Pollutant	Emission Factors[1,2]		Emission Rates (lb/hr)	Emission Rates (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ Table 1
VOC[3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2[4]	5.88E-04	lb/MMBtu	6.20E-03	2.72E-02	AP42 Tbl 3.2-3; 4SRB
PM_{10}[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
$PM_{2.5}$[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
TSP[5]	1.94E-02	lb/MMBtu	0.20	0.90	AP42 Tbl 3.2-3; 4SRB
Acetaldehyde	9.67E-03	g/bhp-hr	2.94E-02	0.13	AP42 Tbl 3.2-3; 4SRB
Acrolein	9.12E-03	g/bhp-hr	2.77E-02	0.12	AP42 Tbl 3.2-3; 4SRB
Benzene	5.48E-03	g/bhp-hr	1.67E-02	0.07	AP42 Tbl 3.2-3; 4SRB
Total HAPS			0.28	1.22	AP42 Tbl 3.2-3; 4SRB

Sample Calcs:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr.

(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr.

(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr.

1. Horsepower, heat rate, fuel heating values, exhaust flow rate, and formaldehyde emission factor from manufacturer spec sheet. Emission factors for NO_x, CO, and VOC from NSPS JJJJ Table 1.
2. Emission factors for HAPs (other than formaldehyde) based on AP-42, Chapter 3.2, Table 3.2-3 (7/00).
3. VOC Emission Factor calculated by summing VOC from NSPS JJJJ and formaldehyde value from the manufacturer spec sheet.
4. SO_2 emissions based on AP-42, Chapter 3.2, Table 3.2-3 (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf.
5. Emission factor for PM_{10} & $PM_{2.5}$ from AP-42, Chapter 3.2, Table 3.2-3 (7/00), including $PM_{10}/PM_{2.5}$ filterable (9.50-03 lb/MMBtu) & PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP EMISSIONS

HAP Compounds	AP-42 Emission Factor (lb/MMBtu)	Emission Factor[1] (g/hp-hr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
CH_2O		0.05	0.15	0.67
1,1,2,2-Tetrachloroethane	2.53E-05	8.77E-05	2.67E-04	1.17E-03
1,1,2-Trichloroethane	1.53E-05	5.31E-05	1.61E-04	7.07E-04
1,3-Butadiene	6.63E-04	2.30E-03	6.99E-03	0.03
1,3-Dichloropropene	1.27E-05	4.40E-05	1.34E-04	5.87E-04
Acetaldehyde	2.79E-03	9.67E-03	0.03	0.13
Acrolein	2.63E-03	9.12E-03	0.03	0.12
Benzene	1.58E-03	5.48E-03	0.02	0.07
Carbon Tetrachloride	1.77E-05	6.14E-05	1.87E-04	8.18E-04
Chlorobenzene	1.29E-05	4.47E-05	1.36E-04	5.96E-04
Chloroform	1.37E-05	4.75E-05	1.45E-04	6.33E-04
Ethylbenzene	2.48E-05	8.60E-05	2.62E-04	1.15E-03
Ethylene Dibromide	2.13E-05	7.39E-05	2.25E-04	9.84E-04
Methanol	3.06E-03	0.01	0.03	0.14
Methylene Chloride	4.12E-05	1.43E-04	4.35E-04	1.90E-03
Naphthalene	9.71E-05	3.37E-04	1.02E-03	4.49E-03
PAH	1.41E-04	4.89E-04	1.49E-03	6.52E-03
Styrene	1.19E-05	4.13E-05	1.26E-04	5.50E-04
Toluene	5.58E-04	1.93E-03	5.89E-03	0.03
Vinyl Chloride	7.18E-06	2.49E-05	7.58E-05	3.32E-04
Xylene	1.95E-04	6.76E-04	2.06E-03	9.01E-03
TOTAL HAP EMISSIONS			**0.28**	**1.22**

[1] Emission Factors derived from AP-42 Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES. Formaldehyde (CH2O) emission factor from manufacturer specification sheet.

Targa Badlands LLC - Robert's Trust Compressor Station
Pig Receiver Emissions Calculations (Nat Gas)

Basis of Calculation:
Emissions from pigging operations are calculated based on a mass balance as follows:

Maximum Uncontrolled Hourly Emissions (lb/hr) = [Volume of gas in pipe per pigging event (scf/event)] x [MW of stream (lb/lb-mol)] x [wt % VOC or speciated constituent] * [events per hour (event/hr) / [379.5 (scf/lb-mol)]

Maximum Uncontrolled Annual Emissions (tpy) = [Volume of gas in pipe x Frequency of events (events/yr)] x [MW of stream (lb/lb-mol)] x [wt % VOC or speciated constituent] / [379.5 (scf/lb-mol)] / [2,000 (lb/ton)]

Pig Receiver Emissions

Estimated Gas Vented per Pigging Event [1] =	26.7	scf/event
Maximum Number of Hourly Pigging Events =	2	events/hr
Annual Number of Pigging Events =	2,920	events/yr
Molecular Weight of Stream =	26.987	lb/lb-mol
Control Type =	None	

Compound	Composition (wt %)	Maximum Uncontrolled Hourly Emissions (lb/hr)	Maximum Uncontrolled Annual Emissions (tpy)
Methane	31.8586	0.61	0.88
Ethane	24.4057	0.46	0.68
Propane	21.2762	0.40	0.59
Isobutane	2.7856	0.05	0.08
n-Butane	8.7365	0.17	0.24
Neopentane	0.0112	2.13E-04	3.11E-04
Isopentane	1.7122	0.03	0.05
n-Pentane	2.3621	0.04	0.07
2,2-Dimethylbutane	0.0109	2.07E-04	3.02E-04
2,3-Dimethylbutane	0.1523	2.89E-03	4.22E-03
2-Methylpentane	0.4453	8.46E-03	0.01
3-Methylpentane	0.2928	5.56E-03	8.12E-03
n-Hexane	0.5831	0.01	0.02
Heptanes	0.7994	0.02	0.02
Octanes	0.1072	2.04E-03	2.97E-03
Nonanes	0.0347	6.59E-04	9.62E-04
Decanes plus	0.0018	3.42E-05	4.99E-05
Benzene	0.0442	8.39E-04	1.23E-03
Toluene	0.0192	3.65E-04	5.32E-04
Ethylbenzene	0.0025	4.75E-05	6.93E-05
M&P Xylene	0.0048	9.12E-05	1.33E-04
O-Xylene	0.0012	2.28E-05	3.33E-05
2,2,4-Trimethylpentane	0.1086	2.06E-03	3.01E-03
Nitrogen	3.3511	0.06	0.09
Carbon Dioxide	1.0733	0.02	0.03
Oxygen	0.00	-	-
Hydrogen Sulfide	0.00	-	-
Total VOC	**39.49**	**0.75**	**1.10**
H_2S	**0.00**	-	-
Total HAP	**0.76**	**0.01**	**0.02**

[1] This is a representative estimate of the amount of gas vented per pigging event and is based on the worst-case pig receiver volume.

Targa Badlands LLC - Robert's Trust Compressor Station
Pig Receiver Emissions Calculations (Crude Oil)

Basis of Calculation:
Emissions from pigging operations are calculated based on a mass balance as follows:

Maximum Uncontrolled Hourly Emissions (lb/hr) = [Volume of gas in pipe per pigging event (scf/event)] x [MW of stream (lb/lb-mol)] x [wt % VOC or speciated constituent] * [events per hour (event/hr) / [379.5 (scf/lb-mol)]

Maximum Uncontrolled Annual Emissions (tpy) = [Volume of gas in pipe x Frequency of events (events/yr)] x [MW of stream (lb/lb-mol)] x [wt % VOC or speciated constituent] / [379.5 (scf/lb-mol)] / [2,000 (lb/ton)]

Pig Receiver Emissions

Estimated Gas Vented per Pigging Event =	47.49	scf/event
Maximum Number of Hourly Pigging Events =	3	events/hr
Annual Number of Pigging Events =	156	events/yr
Molecular Weight of Stream =	114.65	lb/lb-mol
Control Type =	None	

Compound	Composition (wt %)	Maximum Uncontrolled Hourly Emissions (lb/hr)	Maximum Uncontrolled Annual Emissions (tpy)
Methane	0.0038	1.64E-03	4.25E-05
Ethane	0.1627	0.07	1.82E-03
Propane	1.5061	0.65	0.02
Isobutane	0.8008	0.34	8.96E-03
n-Butane	4.0703	1.75	0.05
Neopentane	0.0412	0.02	4.61E-04
Isopentane	2.1965	0.95	0.02
n-Pentane	3.7761	1.63	0.04
2,2-Dimethylbutane	0.0355	0.02	3.97E-04
2,3-Dimethylbutane	0.5144	0.22	5.76E-03
2-Methylpentane	1.8588	0.80	0.02
3-Methylpentane	1.2032	0.52	0.01
n-Hexane	3.4799	1.50	0.04
Heptanes	11.102	4.78	0.12
Octanes	7.1877	3.09	0.08
Nonanes	8.6711	3.73	0.10
Decanes plus	49.1564	21.16	0.55
Benzene	0.4206	0.18	4.71E-03
Toluene	0.7505	0.32	8.40E-03
Ethylbenzene	0.4171	0.18	4.67E-03
M&P Xylene	1.2446	0.54	0.01
O-Xylene	0.3893	0.17	4.36E-03
2,2,4-Trimethylpentane	1.4271	0.61	0.02
Nitrogen	0.0048	2.07E-03	5.37E-05
Carbon Dioxide	0.00	-	-
Oxygen	0.00	-	-
Hydrogen Sulfide	0.00	-	-
Total VOC	**100**	**43.15**	**1.12**
H_2S	**0.00**	-	-
Total HAP	**8.13**	**3.50**	**0.09**

Targa Badlands LLC - Robert's Trust Compressor Station
Doosan/PSI FPSIB21.9NGP - IC Engine Emissions Calculations

Robert's Trust Compressor Station Engine Data (EU 35/EPN 35)					
IC Engine Make [1]	Doosan/PSI		Higher Heating Value [6]	1,436.0	Btu/scf
IC Engine Model [1]	FPSIB21.9NGP		Lower Heating Value [6]	1,308.0	Btu/scf
Power Rating [1,5]	507	bhp	Sulfur Content [2]	2.00E-03	gr/scf
Heat Rate (HHV)	10,703	Btu/bhp-hr	Fuel Consumption [1]	3,779	scf/hr
Duty (input)	5.43	MMBtu/hr	Fuel Consumption	33.10	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	2,427	acfm

Criteria Pollutant	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	1.12	4.90	NSPS JJJJ, Table 1
CO	2.00	g/bhp-hr	2.24	9.79	NSPS JJJJ, Table 1
VOC [3]	0.80	g/bhp-hr	0.89	3.91	NSPS JJJJ, Table 1; AP-42 Tbl 3.2-3 4SRB (7/00)
Formaldehyde	2.05E-02	lb/MMBtu	0.11	0.49	AP-42 Tbl 3.2-3; 4SRB (7/00)
SO_2 [2]	5.88E-04	lb/MMBtu	3.19E-03	0.01	AP-42 Tbl 3.2-3; 4SRB (7/00)
PM_{10} [4]	0.019	lb/MMBtu	0.11	0.46	AP-42 Tbl 3.2-3; 4SRB (7/00)
$PM_{2.5}$ [4]	0.019	lb/MMBtu	0.11	0.46	AP-42 Tbl 3.2-3; 4SRB (7/00)
TSP	0.019	lb/MMBtu	0.11	0.46	AP-42 Tbl 3.2-3; 4SRB (7/00)
Total HAP	-	-	0.18	0.77	AP-42 Tbl 3.2-3; 4SRB (7/00)

GHG	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [7]
CO_2	110.00	lb/MMBtu	596.93	2,614.56	AP-42 Tbl 3.2-3; 4SRB (7/00)
CH_4	2.3E-01	lb/MMBtu	1.25	5.47	AP-42 Tbl 3.2-3; 4SRB (7/00)
N_2O	1.0E-04	kg/MMBtu	1.20E-03	5.24E-03	40 CFR 98 Subpart C, Table C-2
CO_2e	-	-	628.49	2,752.79	-

Sample Calculations:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr
(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr
(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr

1. Information from manufacturer's specification sheet.
2. SO_2 emissions based on AP-42 Section 3.2, Table 3.2-3 footnote e (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf. Sulfur content of fuel at the Robert's Trust Compressor Station assumed to be 2,000 grains/MMscf.
3. Per NSPS JJJJ Table 1, footnote d, formaldehyde is not included in the VOC emission factors in Table 1. As such, the formaldehyde emission factor of 2.05E-02 lb/MMBtu from AP-42 is converted to g/bhp-hr and added to the VOC emission factor in order to represent total VOCs.
4. Emission factor for TSP, PM_{10} and $PM_{2.5}$ from AP-42 Section 3.2, Table 3.2-3 (7/00); includes PM_{10}/$PM_{2.5}$ filterable (9.50e-03 lb/MMBtu) and PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.
5. Rated at 507 hp at standby.
6. Heat value from inlet gas sample, sampled 7/22/2015.
7. Emission factors for GHG from either AP-42 Section 3.2, Table 3.2-3 (7/00) or 40 CFR 98 Subpart C - General Stationary Fuel Combustion Sources, Table C-2. The CO_{2e} emission factor is calculated using the Global Warming Potential (GWP) of 1 for CO_2, 25 for CH_4, and 298 for N_2O.

HAP	Rich Burn Emission	HAP Emissions	
		(lb/hr)	(tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	1.37E-04	6.01E-04
1,1,2-Trichloroethane	1.53E-05	8.30E-05	3.64E-04
1,3-Butadiene	6.63E-04	3.60E-03	0.02
1,3-Dichloropropene	1.27E-05	6.89E-05	3.02E-04
Acetaldehyde	2.79E-03	0.02	0.07
Acrolein	2.63E-03	0.01	0.06
Benzene	1.58E-03	8.57E-03	0.04
Carbon Tetrachloride	1.77E-05	9.61E-05	4.21E-04
Chlorobenzene	1.29E-05	7.00E-05	3.07E-04
Chloroform	1.37E-05	7.43E-05	3.26E-04
Ethylbenzene	2.48E-05	1.35E-04	5.89E-04
Ethylene Dibromide	2.13E-05	1.16E-04	5.06E-04
Formaldehyde	2.05E-02	0.11	0.49
Methanol	3.06E-03	0.02	0.07
Methylene Chloride	4.12E-05	2.24E-04	9.79E-04
Naphthalene	9.71E-05	5.27E-04	2.31E-03
PAH	1.41E-04	7.65E-04	3.35E-03
Styrene	1.19E-05	6.46E-05	2.83E-04
Toluene	5.58E-04	3.03E-03	0.01
Vinyl Chloride	7.18E-06	3.90E-05	1.71E-04
Xylene	1.95E-04	1.06E-03	4.63E-03
Total HAP Emissions		**0.18**	**0.77**

1. HAP emission factors from AP-42 Section 3.2, Table 3.2-3 (7/00).

Targa Badlands LLC - Robert's Trust Compressor Station
Vapor Combuster Emission Calculations

Total Emissions from VCU (EU 36/EPN 36)[1]		
Pollutant	**(lb/hr)**	**(tpy)**
NO_x	1.46E-02	0.06
CO	0.07	0.29
SO_2	2.61E-05	1.15E-04
VOC	0.23	0.99
HAPs	7.48E-03	0.03

1. Total emissions from the vapor combustor include emissions from the combustion of pilot gas, combustion of gas vented from the condensate (EU 11) and produced water tank (EU 9) and VOCs from uncombusted vent gas.

Calculations of Condensate Tank Vent Gas Emissions			
Parameters [1]	**Hourly Value**	**Annual Value**	**Unit**
Vapor MW	41.32	41.32	lb/lb-mol
Net Heating Value	1,946.71	1,946.71	btu/scf
Gross Heating Value	2,116.10	2,116.10	btu/scf
Vapor Volumetric Flow [2]	35.70	35.70	scfh
VOC Destruction Efficiency	95.00		%

Pollutant	Emission Factor (lb/MMbtu)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx [3, 4]	0.068	0.01	0.04
CO [3, 4]	0.31	0.04	0.19
VOC [5]	--	0.17	0.76

HAP Emissions from VCU[6]	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
2,2,4-TMP	2.93E-04	1.28E-03
Benzene	3.23E-04	1.41E-03
Ethylbenzene	2.38E-05	1.04E-04
n-Hexane	5.88E-03	0.03
Toluene	2.76E-04	1.21E-03
Xylenes	3.76E-05	1.65E-04
Total HAPs [6]	**6.83E-03**	**0.03**

1. Vapor MW, heating values, and vapor volumetric flow are obtained from the ProMax output for the condensate and produced water tanks.

2. The volumetric flow for flash losses is calculated by summing the vapor volumetric flow for the vapor stream from the ProMax files and the working and breathing losses, converted to cubic feet per hour. Vapor volumetric flowrate multiplied by 1/4 for condensate and 1/2 for produced water to account for one condensate and one produced water tank routing to EU 36.
3. Emission Factors from AP-42 Table 13.5-1, Chapter 13.5 (Industrial Flares, 2/18).
4. Emissions are calculated as (Emission Factor)*(Gross Heating Value)*(Vapor Volumetric Flow)/(1,000,000 Btu/MMBtu). Annual emissions are converted to tons per year.
5. VOC emissions are calculated based on ProMax outputs and are calculated as [(Working and Breathing Losses)+(Flash Losses)]*(1-95% control efficiency) from the condensate tank, and 0% for the produced water tank.
6. HAP hourly and annual emissions based off condensate ProMax results and VOC destruction efficiency.

Calculations of Produced Water Tank Vent Gas Emissions			
Parameters [1]	**Hourly Value**	**Annual Value**	**Unit**
Vapor MW	41.32	41.32	lb/lb-mol
Net Heating Value	1,946.71	1,946.71	btu/scf
Gross Heating Value	2,116.10	2,116.10	btu/scf
Vapor Volumetric Flow [2]	32.08	32.08	scfh
VOC Destruction Efficiency	0.00		%

Calculations of Pilot Gas Combustion Emissions		
VCU Information [1]		
VOC DRE [1]	95	%
Pilot Gas Flow [1]	50	SCFH
Heat Content [2]	1,436	Btu/scf

Pollutant	Emission Factor [3]		Emissions (lb/hr)	Emissions (tpy)
NO_X [4]	0.068	lb/MMBtu	4.88E-03	0.02
CO [4]	0.31	lb/MMBtu	0.02	0.10

1. Information from vendor specification sheet.
2. Heat Content from fuel gas analysis.
3. Emission Factors from AP-42 Table 13.5-1, Chapter 13.5 (Industrial Flares, 2/18) and AP-42 Table 1.4-3, Chapter 1.4 (Natural Gas Combustion, 7/98).
4. Emissions calculated as (Emission Factor)(Pilot Gas Heat Content)(Pilot gas Flow)(1 MMBtu/ 1,000,000 Btu). Annual emission include conversion factors to convert to tons per year.

Calculations of Pilot Gas VOC Emissions

$$M=\frac{60(MW)PV}{RT}$$

Where *m=mass flow rate in lb/hr*
MW=molecular weight in lb/lbmole
P=standard pressure=14.7 psia
V=flow rate in scfm
R=gas constant=10.73 psia·ft^{3}·lbmol^{-1}·^{o}R^{-1}, and
T=standard temperature=528^{o}R

Constituent [1]	Federal HAP?	Molecular Weight (lb/lb-mole)	Mole % [1] (%)	Volume Flow Rate (scf/hr)	Mass Flow Rate (lb/hr)	Pilot Gas Emissions (lb/hr)	Pilot Gas Emissions (tpy)
Methane	No	16.043	57.06%	28.53	1.19	5.94E-02	2.60E-01
Ethane	No	30.070	22.21%	11.11	0.87	4.33E-02	1.90E-01
Propane	No	44.097	11.50%	5.75	0.66	3.29E-02	1.44E-01
i-Butane	No	58.123	1.07%	0.54	0.08	4.04E-03	1.77E-02
n-Butane	No	58.123	2.82%	1.41	0.21	1.06E-02	4.66E-02
i-Pentane	No	72.150	0.43%	0.22	0.04	2.03E-03	8.89E-03
n-Pentane	No	72.150	0.35%	0.17	0.03	1.63E-03	7.12E-03
n-Hexane (hexanes +) [2]	Yes	86.177	0.12%	0.06	1.31E-02	6.53E-04	2.86E-03
n-Heptane	No	100.210	0.00%	--	--	--	--
H_2O	No	18.015	0.00%	--	--	--	--
CO_2	No	44.010	0.72%	0.36	0.04	2.06E-03	9.02E-03
N_2	No	28.013	3.72%	1.86	0.14	6.76E-03	2.96E-02
					Total Emissions	1.63E-01	7.16E-01
					Total VOC Emissions	5.19E-02	2.27E-01
					Total HAP Emissions [2]	6.53E-04	2.86E-03

1. Constituents and Mol % from fuel gas analysis dated 07/22/2015.
2. Total HAP Emissions are conservatively assumed to be n-Hexane (hexanes +).

Calculations of Pilot Gas SO_2 Emissions

SO_2 is based on a material balance with 100% flare efficiency and a maximum 4 ppm fuel Sulfur content.

Gas Stream	Flare Efficiency Fraction	Fuel Burned (lbs/hr)	SO_2 [1] (lb/hr)	SO_2 [1] (TPY)
Fuel Gas	1.00	3.27	2.61E-05	1.15E-04

1. Emissions calculated are equal to (Flare Efficiency Fraction)*(Pilot Fuel Burned)*(Fuel Sulfur Content)*(Mole Wt. of SO2)/(Mole Wt. of Sulfur). Annual emission are converted to tons per year.

Calculations of GHG Emissions

	Hourly (MMBtu/hr)	Annual Average (MMBtu/hr)
Total Heat Content [1]	0.22	0.22

Pollutant	Emission Factor [2] lb/MMBtu	GWPs [3]	Emission Rate [4] lb/hr	Emission Rate [4] tpy
CO_2	142.79	1	30.73	134.61
CH_4	6.61E-03	25	1.42E-03	6.23E-03
N_2O	1.32E-03	298	2.85E-04	1.25E-03
Total CO_2e	-	-	30.85	135.14

1. Total heat content is calculated by multiplying the pilot fuel gas heat content by the pilot gas fuel flow and adding the tank vent gas heat content multiplied by the tank vent gas flow.
2. GHG emission factors from 40 CFR 98 Table C-1 for butane and 40 CFR 98 Table C-2 for Petroleum (All fuel types in Table C-1).
3. Global Warming Potentials (GWPs) from 40 CFR 98 Table A-1.

QUESTAR APPLIED TECHNOLOGY

1210 D. Street, Rock Springs, Wyoming 82901 (307) 352-7292

LIMS ID:	N/A		Description:	Johnson Corners Terminal
Analysis Date/Time:	8/22/2013	8:16AM	Field:	McKenzie,ND
Analyst Initials:	PRP		ML#:	TARGA Badlands LLC
Sample Temperature:	62		GC Method:	Quesliql GPA 2186
Sample Pressure:	25		Data File:	QPC66.D
Date Sampled:	8/19/2013		Instrument ID:	1

Component	Mol%	Wt %	LV%
Methane	0.0274	0.0038	0.0091
Ethane	0.6204	0.1627	0.3262
Propane	3.9159	1.5061	2.1211
Isobutane	1.5796	0.8008	1.0163
n-Butane	8.0289	4.0703	4.9768
Neopentane	0.0655	0.0412	0.0493
Isopentane	3.4804	2.1965	2.5098
n-Pentane	6.0005	3.7761	4.2766
2,2-Dimethylbutane	0.0472	0.0355	0.0387
2,3-Dimethylbutane	0.6843	0.5144	0.5514
2-Methylpentane	2.4730	1.8588	2.0183
3-Methylpentane	1.6008	1.2032	1.2845
n-Hexane	4.6298	3.4799	3.7433
Heptanes	13.9081	11.8525	11.6669
Octanes	10.8273	10.6668	10.3807
Nonanes	8.1327	8.6711	8.2353
Decanes plus	33.8487	49.1564	46.7915
Nitrogen	0.0195	0.0048	0.0042
Carbon Dioxide	0.0000	0.0000	0.0000
Total	100.0000	99.9999	100.0000

Global Properties	**Units**					
Avg Molecular Weight	114.8510 gm/mole	114.651				
Pseudocritical Pressure	400.48 psia	Pseudocritical Temperatu	541.25 degF	Specific Gravity	0.71432 gm/ml Liquid Density	5.9553 lb/gal Liquid Density	250.12 /bbb/ Specific Gravity	2.7150 air=1
SCF/bbl	830.05 SCF/bbl	SCF/gal	19.7631	SCF/gal MCF/gal	0.0198 MCF/gal gal/MCF	50.626 gal/MCF		
Net Heating Value	5721.2 BTU/SCF at 60oF							
Net Heating Value	19000.0 BTU/lb at 60°F	Gross Heating Value	5730.9 BTU/SCF at 60°F	Gross Heating Value	20468.2 BTU/lb at 60°F	Gross Heating Value	122801.2 BTU/gal at 60oF	API Gravity	66.6	
MON	45.3							
RON	46.3							
RVP	22.654 psia							

Component	Mol%	Wt%	LV%
Benzene	0.6173	0.4206	0.3396
Toluene	0.9338	0.7505	0.6148
Ethylbenzene	0.4504	0.4171	0.3418
M&P Xylene	1.3441	1.2446	1.0233
O-Xylene	0.4204	0.3893	0.3143
2,2,4-Trimethylpentane	1.4324	1.4271	1.4154

Natural Gas Analysis Report

Sample Information

	Sample Information
Sample Name	Roberts Trust Fuel Gas
Operator	Travis Wollesen
Company	Wham, LLC
GQ Source Number	700082
Sample Temp	47
Sample Pressure	154
Client	Targa
Method Name	ND 5 C6+H2S.met
Injection Date	2015-07-22 17:17:04
Report Date	2015-07-22 12:29:58
Source Data File	2015-07-22 12-16-42 (GMT -05-00)-Rep1.dat
EZReporter Data File	Roberts Trust Fuel Gas-20150722-122743.btu
NGA Phys. Property Data Source	GPA Standard 2145-09 (FPS)

Component Results

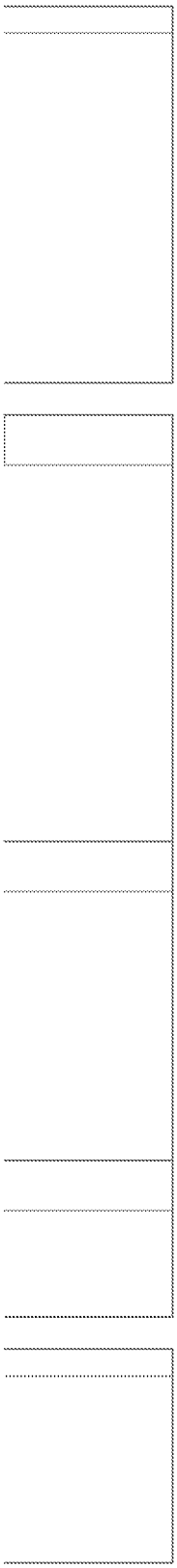
Component Name	Raw Amount	Norm%	Gross HV (Dry) (BTU / Ideal cu.ft.)	Gross HV (Sat.) (BTU / Ideal cu.ft.)	GPM (Dry) (Gal. / 1000 cu.ft.)
Methane	56.1600	57.0577	577.6	567.6	9.720
Ethane	21.8620	22.2114	394.0	387.1	5.967
Propane	11.3150	11.4958	289.9	284.9	3.181
i-Butane	1.0540	1.0708	34.9	34.3	0.352
n-Butane	2.7800	2.8244	92.4	90.7	0.895
i-Pentane	0.4270	0.4338	17.4	17.1	0.160
n-Pentane	0.3420	0.3475	14.0	13.7	0.126
Carbon Dioxide	0.7100	0.7213	0.0	0.0	0.123
Hydrogen Sulfide	0.0000	0.0000	0.0	0.0	0.000
Nitrogen	3.6620	3.7205	0.0	0.0	0.411
Hexanes Plus	0.1150	0.1168	6.0	5.9	0.051
Water	0.0000	0.0000	0.0	0.0	0.000
Air	0.0000	0.0000	0.0	0.0	0.000
Total:	98.4270	100.0000	1426.1	1401.3	20.986

Component Name	GPM (Sat) (Gal. / 1000 cu.ft.)
Methane	9.554
Ethane	5.865
Propane	3.127
i-Butane	0.346
n-Butane	0.880
i-Pentane	0.157
n-Pentane	0.124
Carbon Dioxide	0.121
Hydrogen Sulfide	0.000
Nitrogen	0.404

Component Name	GPM (Sat) (Gal. / 1000 cu.ft.)
Hexanes Plus	0.050
Water	0.100
Air	0.000
Total:	20.728

Results Summary

Result	Dry	Sat.
Total Raw Mole% (Dry)	98.4270	
Total Normalzed Mole%	100.0000	100.0000
Pressure Base (psia)	14.730	
Gross Heating Value (BTU / Ideal cu.ft.)	1426.1	1401.3
Gross Heating Value (BTU / Real cu.ft.)	1433.4	1409.0
Relative Density (G), Real	0.8742	0.8702
Compressibility (Z) Factor	0.9949	0.9946



GlyCalc Dry Gas Stream

Component	Mol Wt	Volume %	lb/hr	Wt %
Water	18	0.00632	1.38	4.57543E-05
CO2	44	0.72	383	0.012698472
N2	28	4.29	1450	0.048075154
Methane	16	57.8	11200	0.371339118
Ethane	30	21.7	7900	0.2619267
Propane	44.097	10.9	5790	0.191969062
I-Butane	58.12	0.979	687	0.022777676
n-butane	58.12	2.73	1910	0.063326582
I-pentane	72.15	0.328	286	0.00948241
n-pentane	72.15	0.397	346	0.011471726
n-hexane	86.18	0.0449	46.7	0.001548352
cyclohexane	84.16	0.00597	6.07	0.000201253
other hexanes	86.18	0.0866	90.2	0.002990606
heptanes	100.21	0.0378	45.8	0.001518512
methylcyclohexane	98.19	0.00398	4.72	0.000156493
2,2,4-trimethylpentane	114.23	0.004	5.52	0.000183017
benzene	78.11	0.00379	3.57	0.000118364
toluene	92.14	0.000938	1.04	3.44815E-05
C8+heavies	114.21	0.002	4.11	0.000136268
			30161.11	
VOC wt %	30.59%			
Mol Wt	24.93			

QUESTAR APPLIED TECHNOLOGY

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

LIMS ID:	N/A		Description:	Roberts Trust Comp. Sta.
Analysis Date/Time:	6/14/2013	12:12 PM	Field:	Badlands
Analyst Initials:	PRP		ML#:	TARGA Badlands LLC
Instrument ID:	Instrument 1		GC Method:	Quesbtex
Data File:	QPC32.D			
Date Sampled:	6/11/2013			

Component	Mol%	Wt%	LV%
Methane	53.5921	31.8586	42.1062
Ethane	21.9035	24.4057	27.2262
Propane	13.0209	21.2762	16.6409
Isobutane	1.2934	2.7856	1.9623
n-Butane	4.0564	8.7365	5.9315
Neopentane	0.0042	0.0112	0.0075
Isopentane	0.6404	1.7122	1.0872
n-Pentane	0.8835	2.3621	1.4841
2,2-Dimethylbutane	0.0034	0.0109	0.0066
2,3-Dimethylbutane	0.0477	0.1523	0.0906
2-Methylpentane	0.1394	0.4453	0.2684
3-Methylpentane	0.0917	0.2928	0.1735
n-Hexane	0.1826	0.5831	0.3481
Heptanes	0.2212	0.7994	0.4278
Octanes	0.0253	0.1072	0.058
Nonanes	0.0076	0.0347	0.0183
Decanes plus	0.0003	0.0018	0.001
Nitrogen	3.2283	3.3511	1.6416
Carbon Dioxide	0.6581	1.0733	0.5202
Oxygen	0	0	0
Hydrogen Sulfide	0	0	0
Total	100.00	100.00	100.00

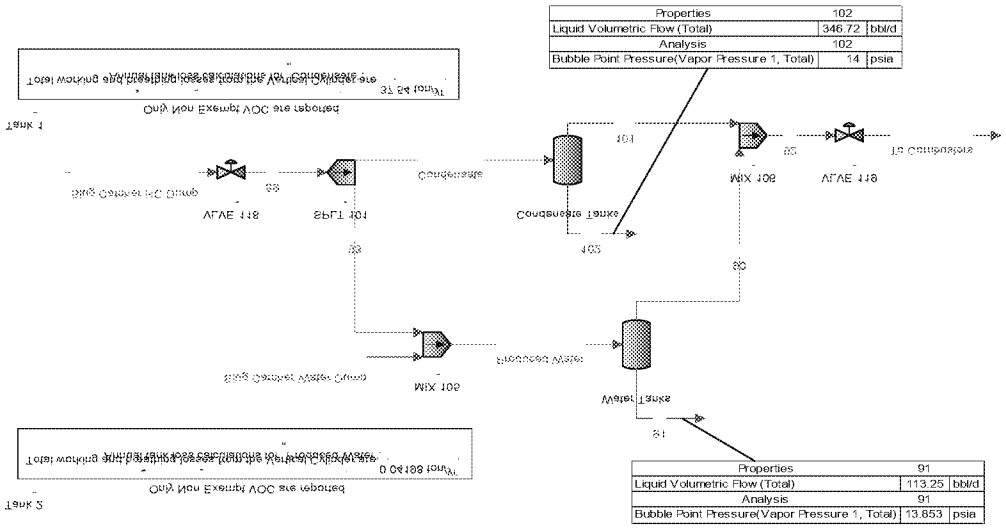
Global Properties		Units
Gross BTU/Real CF	1540.6	BTU/SCF at 60°F and14.73 psia
Sat.Gross BTU/Real CF	1515.4	BTU/SCF at 60°F and14.73 psia
Gas Compressibility (Z)	0.9940	
Specific Gravity	0.9339	air=1
Avg Molecular Weight	26.987	gm/mole
Propane GPM	3.568543	gal/MCF
Butane GPM	1.697727	gal/MCF
Gasoline GPM	0.828036	gal/MCF
26# Gasoline GPM	2.104348	gal/MCF
Total GPM	12.426716	gal/MCF
Base Mol%	100.705	%v/v

Sample Temperature:	58	°F
Sample Pressure:	37	psig
H2SLength of Stain Tube	N/A	ppm

Component	Mol%	Wt%	LV%
Benzene	0.0153	0.0442	0.0198
Toluene	0.0056	0.0192	0.0087
Ethylbenzene	0.0006	0.0025	0.0011
M&P Xylene	0.0012	0.0048	0.0022
O-Xylene	0.0003	0.0012	0.0005
2,2,4-Trimethylpentane	0.0257	0.1086	0.0598
Cyclopentane	0	0	0
Cyclohexane	0.0293	0.0912	0.0462
Methylcyclohexane	0.0297	0.1079	0.0553
Description:	Roberts Trust Comp. Sta.		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	0.6581	1.0733	0.5202
Hydrogen Sulfide	0.0000	0.0000	0.0000
Nitrogen	3.2283	3.3511	1.6416
Methane	53.5921	31.8586	42.1062
Ethane	21.9035	24.4057	27.2262
Propane	13.0209	21.2762	16.6409
Isobutane	1.2934	2.7856	1.9623
n-Butane	4.0564	8.7365	5.9315
Isopentane	0.6446	1.7234	1.0947
n-Pentane	0.8835	2.3621	1.4841
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.1826	0.5831	0.3481
Cyclohexane	0.0293	0.0912	0.0462
Other Hexanes	0.2822	0.9013	0.5391
Heptanes	0.1156	0.4283	0.2380
Methylcyclohexane	0.0297	0.1079	0.0553
2,2,4 Trimethylpentane	0.0257	0.1086	0.0598
Benzene	0.0153	0.0442	0.0198
Toluene	0.0056	0.0192	0.0087
Ethylbenzene	0.0006	0.0025	0.0011
Xylenes	0.0015	0.0060	0.0027
C8+ Heavies	0.0311	0.1352	0.0735
Subtotal	100.0000	100.0000	100.0000
Oxygen	0.0000	0.0000	0.0000
Total	100.0000	100.0000	100.0000


Properties 102
Liquid Volumetric Flow (Total) 346.72 bbl/d
Analysis 102
Bubble Point Pressure(Vapor Pressure 1, Total) 14 psia
Properties 91
Liquid Volumetric Flow (Total) 113.25 bbl/d
Analysis 91
Bubble Point Pressure(Vapor Pressure 1, Total) 13.853 psia

[illegible]												
Carbon Dioxide	0	0	0*	0*	0	0		0	0	0	0	0
Nitrogen	0.0844932	0.000389728	0.0844932*	0*	15.0153	0.0844932		0.000389728	15.0153	0.0844932	15.0153	0.0221699
Methane	0.115926	0.000534713	0.115926*	0*	11.7526	0.115926		0.000534713	11.7526	0.115926	11.7526	0.0673529
Ethane	0.992396	0.00457746	0.992396*	0*	20.3859	0.992396		0.00457746	20.3859	0.992396	20.3859	0.911445
Propane	4.61435	0.0212838	4.61435*	0*	25.5637	4.61435		0.0212838	25.5637	4.61435	25.5637	4.52690
i-Butane	2.12635	0.00980787	2.12635*	0*	4.10608	2.12635		0.00980787	4.10608	2.12635	4.10608	2.11809
n-Butane	10.2376	0.0472213	10.2376*	0*	12.6143	10.2376		0.0472213	12.6143	10.2376	12.6143	10.2277
i-Pentane	6.86357	0.0316584	6.86357*	0*	3.16575	6.86357		0.0316584	3.16575	6.86357	3.16575	6.87901
n-Pentane	13.7728	0.0635277	13.7728*	0*	4.49887	13.7728		0.0635277	4.49887	13.7728	4.49887	13.8115
n-Hexane	11.4702	0.0529069	11.4702*	0*	0.918440	11.4702		0.0529069	0.918440	11.4702	0.918440	11.5143
Heptane	19.9097	0.0918343	19.9097*	0*	0.425875	19.9097		0.0918343	0.425875	19.9097	0.425875	19.9911
Octane	9.55244	0.0440609	9.55244*	0*	0.0551510	9.55244		0.0440609	0.0551510	9.55244	0.0551510	9.59208
Nonane	1.86593	0.00860666	1.86593*	0*	0.00282332	1.86593		0.00860666	0.00282332	1.86593	0.00282332	1.87371
Decane	0.518675	0.00239240	0.518675*	0*	0.000232368	0.518675		0.00239240	0.000232368	0.518675	0.000232368	0.520839
Water	0	99.5387	0*	100*	0	0		99.5387	0	0	0	0
TEG	0	0	0*	0*	0	0		0	0	0	0	0
EG	0	0	0*	0*	0	0		0	0	0	0	0
2-Methylpentane	8.07616	0.0372515	8.07616*	0*	0.974028	8.07616		0.0372515	0.974028	8.07616	0.974028	8.10580
3-Methylpentane	3.21948	0.0148499	3.21948*	0*	0.347004	3.21948		0.0148499	0.347004	3.21948	0.347004	3.23147
2,2,4-Trimethylpentane	1.39794	0.00644802	1.39794*	0*	0.0334827	1.39794		0.00644802	0.0334827	1.39794	0.0334827	1.40363
Benzene	0.959923	0.00442765	0.959923*	0*	0.0776114	0.959923		0.00442765	0.0776114	0.959923	0.0776114	0.963606
Toluene	2.54505	0.0117391	2.54505*	0*	0.0531905	2.54505		0.0117391	0.0531905	2.54505	0.0531905	2.55545
Ethylbenzene	0.612315	0.00282432	0.612315*	0*	0.00365476	0.612315		0.00282432	0.00365476	0.612315	0.00365476	0.614855
m-Xylene	0.122622	0.000565599	0.122622*	0*	0.000679163	0.122622		0.000565599	0.000679163	0.122622	0.000679163	0.123131
p-Xylene	0.761213	0.00351112	0.761213*	0*	0.00447392	0.761213		0.00351112	0.00447392	0.761213	0.00447392	0.764372
o-Xylene	0.180748	0.000833708	0.180748*	0*	0.000847731	0.180748		0.000833708	0.000847731	0.180748	0.000847731	0.181499
[illegible]												
Carbon Dioxide	0	0	0*	0*	0	0	0	0	0	0	0	0
Nitrogen	0.0345314	0.000348802	0.0348802*	0*	0.0255085	0.0348802	0	0.000348802	0.0255085	0.000348802	0.0255085	0.00902292
Methane	0.0473777	0.000478563	0.0478563*	0*	0.0199658	0.0478563	0	0.000478563	0.0199658	0.000478563	0.0199658	0.0274119
Ethane	0.405581	0.00409678	0.409678*	0*	0.0346322	0.409678	0	0.00409678	0.0346322	0.00409678	0.0346322	0.370949
Propane	1.88583	0.0190455	1.90488*	0*	0.0434284	1.90488	0	0.0190455	0.0434284	0.0190455	0.0434284	1.84240
i-Butane	0.869015	0.00877793	0.877793*	0*	0.00697555	0.877793	0	0.00877793	0.00697555	0.00877793	0.00697555	0.862040
n-Butane	4.18399	0.0422626	4.22626*	0*	0.0214296	4.22626	0	0.0422626	0.0214296	0.0422626	0.0214296	4.16256
i-Pentane	2.80506	0.0283340	2.83340*	0*	0.00537808	2.83340	0	0.0283340	0.00537808	0.0283340	0.00537808	2.79968
n-Pentane	5.62880	0.0568566	5.68566*	0*	0.00764283	5.68566	0	0.0568566	0.00764283	0.0568566	0.00764283	5.62116
n-Hexane	4.68776	0.0473511	4.73511*	0*	0.00156028	4.73511	0	0.0473511	0.00156028	0.0473511	0.00156028	4.68620
Heptane	8.13688	0.0821907	8.21907*	0*	0.000723490	8.21907	0	0.0821907	0.000723490	0.0821907	0.000723490	8.13616
Octane	3.90397	0.0394341	3.94341*	0*	9.36923E-05	3.94341	0	0.0394341	9.36923E-05	0.0394341	9.36923E-05	3.90388
Nonane	0.762584	0.00770286	0.770286*	0*	4.79634E-06	0.770286	0	0.00770286	4.79634E-06	0.00770286	4.79634E-06	0.762579
Decane	0.211976	0.00214118	0.214118*	0*	3.94754E-07	0.214118	0	0.00214118	3.94754E-07	0.00214118	3.94754E-07	0.211976
Water	0	89.0861	0*	89.0861*	0	0	0	89.0861	0	0	0	0
TEG	0	0	0*	0*	0	0	0	0	0	0	0	0
EG	0	0	0*	0*	0	0	0	0	0	0	0	0
2-Methylpentane	3.30063	0.0333397	3.33397*	0*	0.00165471	3.33397	0	0.0333397	0.00165471	0.0333397	0.00165471	3.29898
3-Methylpentane	1.31576	0.0132905	1.32905*	0*	0.000589502	1.32905	0	0.0132905	0.000589502	0.0132905	0.000589502	1.31517
2,2,4-Trimethylpentane	0.571320	0.00577091	0.577091*	0*	5.68816E-05	0.577091	0	0.00577091	5.68816E-05	0.00577091	5.68816E-05	0.571263
Benzene	0.392310	0.00396272	0.396272*	0*	0.000131849	0.396272	0	0.00396272	0.000131849	0.00396272	0.000131849	0.392178
Toluene	1.04013	0.0105064	1.05064*	0*	9.03618E-05	1.05064	0	0.0105064	9.03618E-05	0.0105064	9.03618E-05	1.04004
Ethylbenzene	0.250246	0.00252774	0.252774*	0*	6.20882E-06	0.252774	0	0.00252774	6.20882E-06	0.00252774	6.20882E-06	0.250240
m-Xylene	0.0501143	0.000506205	0.0506205*	0*	1.15378E-06	0.0506205	0	0.000506205	1.15378E-06	0.000506205	1.15378E-06	0.0501131
p-Xylene	0.311099	0.00314241	0.314241*	0*	7.60045E-06	0.314241	0	0.00314241	7.60045E-06	0.00314241	7.60045E-06	0.311091
o-Xylene	0.0738698	0.000746159	0.0746159*	0*	1.44015E-06	0.0746159	0	0.000746159	1.44015E-06	0.000746159	1.44015E-06	0.0738683
[illegible]												
Carbon Dioxide	0	0	0*	0*	0	0		0	0	0	0	0
Nitrogen	0.028	0.000595871	0.028*	0*	10.1788	0.028		0.000595871	10.1788	0.028	10.1788	0.00733118
Methane	0.022	0.000468184	0.022*	0*	4.56252	0.022		0.000468184	4.56252	0.022	4.56252	0.0127547
Ethane	0.353	0.00751223	0.353*	0*	14.8336	0.353		0.00751223	14.8336	0.353	14.8336	0.323515
Propane	2.407	0.0512236	2.407*	0*	27.2783	2.407		0.0512236	27.2783	2.407	27.2783	2.35636
i-Butane	1.462	0.0311130	1.462*	0*	5.77522	1.462		0.0311130	5.77522	1.462	5.77522	1.45322
n-Butane	7.039	0.149798	7.039*	0*	17.7421	7.039		0.149798	17.7421	7.039	17.7421	7.01721
i-Pentane	5.858	0.124665	5.858*	0*	5.52719	5.858		0.124665	5.52719	5.858	5.52719	5.85867
n-Pentane	11.755	0.250159	11.755*	0*	7.85473	11.755		0.250159	7.85473	11.755	7.85473	11.7629
n-Hexane	11.693	0.248840	11.693*	0*	1.91528	11.693		0.248840	1.91528	11.693	1.91528	11.7129
Heptane	23.6	0.502234	23.6*	0*	1.03266	23.6		0.502234	1.03266	23.6	1.03266	23.6460
Octane	12.908	0.274696	12.908*	0*	0.152450	12.908		0.274696	0.152450	12.908	0.152450	12.9340
Nonane	2.831	0.0602468	2.831*	0*	0.00876260	2.831		0.0602468	0.00876260	2.831	0.00876260	2.83675
Decane	0.873	0.0185784	0.873*	0*	0.000800063	0.873		0.0185784	0.000800063	0.873	0.000800063	0.874776
Water	0	97.8719	0*	100*	0	0		97.8719	0	0	0	0
TEG	0	0	0*	0*	0	0		0	0	0	0	0
EG	0	0	0*	0*	0	0		0	0	0	0	0
2-Methylpentane	8.233	0.175207	8.233*	0*	2.03120	8.233		0.175207	2.03120	8.233	2.03120	8.24563
3-Methylpentane	3.282	0.0698446	3.282*	0*	0.723629	3.282		0.0698446	0.723629	3.282	0.723629	3.28721
2,2,4-Trimethylpentane	1.889	0.0402000	1.889*	0*	0.0925538	1.889		0.0402000	0.0925538	1.889	0.0925538	1.89266
Benzene	0.887	0.0188763	0.887*	0*	0.146704	0.887		0.0188763	0.146704	0.887	0.146704	0.888507
Toluene	2.774	0.0590338	2.774*	0*	0.118597	2.774		0.0590338	0.118597	2.774	0.118597	2.77941
Ethylbenzene	0.769	0.0163652	0.769*	0*	0.00938942	0.769		0.0163652	0.00938942	0.769	0.00938942	0.770547
m-Xylene	0.154	0.00327729	0.154*	0*	0.00174483	0.154		0.00327729	0.00174483	0.154	0.00174483	0.154310
p-Xylene	0.956	0.0203447	0.956*	0*	0.0114939	0.956		0.0203447	0.0114939	0.956	0.0114939	0.957923
o-Xylene	0.227	0.00483081	0.227*	0*	0.00217790	0.227		0.00483081	0.00217790	0.227	0.00217790	0.227458
[illegible]												
Carbon Dioxide	0	0	0*	0*	0	0	0	0	0	0	0	0
Nitrogen	0.967342	0.00977114	0.977114*	0*	0.714580	0.977114	0	0.00977114	0.714580	0.00977114	0.714580	0.252763
Methane	0.760055	0.00767732	0.767732*	0*	0.320300	0.767732	0	0.00767732	0.320300	0.00767732	0.320300	0.439755
Ethane	12.1954	0.123186	12.3186*	0*	1.04136	12.3186	0	0.123186	1.04136	0.123186	1.04136	11.1541
Propane	83.1569	0.839969	83.9969*	0*	1.91500	83.9969	0	0.839969	1.91500	0.839969	1.91500	81.2419
i-Butane	50.5091	0.510193	51.0193*	0*	0.405435	51.0193	0	0.510193	0.405435	0.510193	0.405435	50.1037
n-Butane	243.183	2.45639	245.639*	0*	1.24554	245.639	0	2.45639	1.24554	2.45639	1.24554	241.937
i-Pentane	202.382	2.04426	204.426*	0*	0.388022	204.426	0	2.04426	0.388022	2.04426	0.388022	201.994
n-Pentane	406.111	4.10213	410.213*	0*	0.551421	410.213	0	4.10213	0.551421	4.10213	0.551421	405.560
n-Hexane	403.969	4.08050	408.050*	0*	0.134457	408.050	0	4.08050	0.134457	4.08050	0.134457	403.835
Heptane	815.331	8.23567	823.567*	0*	0.0724951	823.567	0	8.23567	0.0724951	8.23567	0.0724951	815.259
Octane	445.945	4.50449	450.449*	0*	0.0107023	450.449	0	4.50449	0.0107023	4.50449	0.0107023	445.934
Nonane	97.8052	0.987932	98.7932*	0*	0.000615156	98.7932	0	0.987932	0.000615156	0.987932	0.000615156	97.8046
Decane	30.1604	0.304650	30.4650*	0*	5.61663E-05	30.4650	0	0.304650	5.61663E-05	0.304650	5.61663E-05	30.1603
Water	0	1604.91	0*	1604.91*	0	0	0	1604.91	0	0	0	0
TEG	0	0	0*	0*	0	0	0	0	0	0	0	0
EG	0	0	0*	0*	0	0	0	0	0	0	0	0
2-Methylpentane	284.433	2.87306	287.306*	0*	0.142595	287.306	0	2.87306	0.142595	2.87306	0.142595	284.291
3-Methylpentane	113.386	1.14532	114.532*	0*	0.0508005	114.532	0	1.14532	0.0508005	1.14532	0.0508005	113.336
2,2,4-Trimethylpentane	65.2611	0.659203	65.9203*	0*	0.00649750	65.9203	0	0.659203	0.00649750	0.659203	0.00649750	65.2546
Benzene	30.6440	0.309536	30.9536*	0*	0.0102990	30.9536	0	0.309536	0.0102990	0.309536	0.0102990	30.6337
Toluene	95.8360	0.968040	96.8040*	0*	0.00832579	96.8040	0	0.968040	0.00832579	0.968040	0.00832579	95.8277
Ethylbenzene	26.5674	0.268357	26.8357*	0*	0.000659160	26.8357	0	0.268357	0.000659160	0.268357	0.000659160	26.5667
m-Xylene	5.32035	0.0537412	5.37412*	0*	0.000122491	5.37412	0	0.0537412	0.000122491	0.0537412	0.000122491	5.32026
p-Xylene	33.0278	0.333614	33.3614*	0*	0.000806902	33.3614	0	0.333614	0.000806902	0.333614	0.000806902	33.0270
o-Xylene	7.84238	0.0792160	7.92160*	0*	0.000152894	7.92160	0	0.0792160	0.000152894	0.0792160	0.000152894	7.84223

Targa Badlands LLC - Robert's Trust Compressor Station
ProMax AP-42 Emissions Report
Annual Condensate Working and Breathing Emissions

Emissions represent four condensate tanks with a total throughput of 339.6 bbl/day.

Components	Molecular Weight	Working Losses (ton/yr)	Working Weight Percent	Breathing Losses (ton/yr)	Breathing Weight Percent	Total Losses (ton/yr)	Total Weight Percent	Working Losses (lb/hr)	Breathing Losses (lb/hr)	Total Losses (lb/hr)
Propane	44.10	4.83	29.83%	6.37	29.83%	11.20	29.83%	1.10	1.45	2.56
i-Butane	58.12	1.31	8.09%	1.73	8.09%	3.04	8.09%	0.30	0.39	0.69
n-Butane	58.12	4.52	27.94%	5.97	27.95%	10.49	27.94%	1.03	1.36	2.39
i-Pentane	72.15	1.45	8.95%	1.91	8.95%	3.36	8.95%	0.33	0.44	0.77
n-Pentane	72.15	2.15	13.31%	2.84	13.31%	5.00	13.31%	0.49	0.65	1.14
n-Hexane	86.18	6.07E-01	3.75%	8.01E-01	3.75%	1.41E+00	3.75%	0.14	0.18	0.32
Heptane	100.21	3.45E-01	2.14%	4.56E-01	2.13%	8.02E-01	2.13%	0.08	0.10	0.18
Ocatne	114.23	5.45E-02	0.34%	7.20E-02	0.34%	1.27E-01	0.34%	0.01	0.02	0.03
Nonane	128.20	3.45E-03	0.02%	4.55E-03	0.02%	8.00E-03	0.02%	7.87E-04	1.04E-03	1.83E-03
Decane	142.29	3.09E-04	0.00%	4.08E-04	0.00%	7.18E-04	0.00%	7.06E-05	9.32E-05	1.64E-04
2-Methylpentane	86.18	6.06E-01	3.74%	8.00E-01	3.74%	1.41E+00	3.74%	0.14	0.18	0.32
3-Methylpentane	86.18	2.16E-01	1.34%	2.86E-01	1.34%	5.02E-01	1.34%	0.05	0.07	0.11
2,2,4-Trimethylpentane	114.22	3.06E-02	0.19%	4.04E-02	0.19%	7.09E-02	0.19%	6.98E-03	9.22E-03	0.02
Benzene	78.11	2.80E-02	0.17%	3.70E-02	0.17%	6.50E-02	0.17%	6.39E-03	8.45E-03	0.01
Toluene	92.14	2.48E-02	0.15%	3.28E-02	0.15%	5.76E-02	0.15%	5.66E-03	7.48E-03	0.01
Ethylbenzene	106.17	2.25E-03	0.01%	2.97E-03	0.01%	5.23E-03	0.01%	5.14E-04	6.79E-04	1.19E-03
m-Xylene	106.16	5.39E-04	0.00%	7.11E-04	0.00%	1.25E-03	0.00%	1.23E-04	1.62E-04	2.85E-04
p-Xylene	106.16	2.51E-03	0.02%	3.31E-03	0.02%	5.82E-03	0.02%	5.72E-04	7.56E-04	1.33E-03
o-Xylene	106.16	4.35E-04	0.00%	5.74E-04	0.00%	1.01E-03	0.00%	9.92E-05	1.31E-04	2.30E-04
VOC Total	**--**	**16.18**	**100.00%**	**21.36**	**100.00%**	**37.54**	**100.00%**	**3.69**	**4.88**	**8.57**
HAP Total	**--**	**0.70**	**4.30%**	**0.92**	**4.30%**	**1.61**	**4.30%**	**0.16**	**0.21**	**0.37**

Vapor Molecular Weight: 60.85

Targa Badlands LLC - Robert's Trust Compressor Station
ProMax AP-42 Emissions Report
Annual Produced Water Working and Breathing Emissions

Emissions represent two produced water tanks with a total throughput of 113.4 bbl/day

Components	Molecular Weight	Working Losses (ton/yr)	Working Weight Percent	Breathing Losses (ton/yr)	Breathing Weight Percent	Total Losses (ton/yr)	Total Weight Percent	Working Losses (lb/hr)	Breathing Losses (lb/hr)	Total Losses (lb/hr)
Propane	44.10	9.49E-03	29.97%	3.10E-03	29.98%	1.26E-02	29.97%	2.17E-03	7.07E-04	2.87E-03
i-Butane	58.12	2.55E-03	8.06%	8.33E-04	8.06%	3.39E-03	8.06%	5.83E-04	1.90E-04	7.73E-04
n-Butane	58.12	8.82E-03	27.87%	2.88E-03	27.87%	1.17E-02	27.87%	2.01E-03	6.57E-04	2.67E-03
i-Pentane	72.15	2.83E-03	8.94%	9.23E-04	8.94%	3.75E-03	8.94%	6.46E-04	2.11E-04	8.57E-04
n-Pentane	72.15	4.21E-03	13.29%	1.37E-03	13.29%	5.58E-03	13.29%	9.60E-04	3.13E-04	1.27E-03
n-Hexane	86.18	1.19E-03	3.75%	3.87E-04	3.75%	1.57E-03	3.75%	2.71E-04	8.84E-05	3.59E-04
Heptane	100.21	6.75E-04	2.13%	2.21E-04	2.13%	8.96E-04	2.13%	1.54E-04	5.03E-05	2.05E-04
Ocatne	114.23	1.07E-04	0.34%	3.48E-05	0.34%	1.41E-04	0.34%	2.43E-05	7.94E-06	3.23E-05
Nonane	128.20	6.74E-06	0.02%	2.20E-06	0.02%	8.94E-06	0.02%	1.54E-06	5.02E-07	2.04E-06
Decane	142.29	6.05E-07	0.00%	1.97E-07	0.00%	8.02E-07	0.00%	1.38E-07	4.51E-08	1.83E-07
2-Methylpentane	86.18	1.18E-03	3.74%	3.87E-04	3.74%	1.57E-03	3.74%	2.70E-04	8.82E-05	3.58E-04
3-Methylpentane	86.18	4.23E-04	1.34%	1.38E-04	1.34%	5.61E-04	1.34%	9.66E-05	3.15E-05	1.28E-04
2,2,4-Trimethylpentane	114.22	5.98E-05	0.19%	1.95E-05	0.19%	7.93E-05	0.19%	1.36E-05	4.45E-06	1.81E-05
Benzene	78.11	5.48E-05	0.17%	1.79E-05	0.17%	7.27E-05	0.17%	1.25E-05	4.09E-06	1.66E-05
Toluene	92.14	4.85E-05	0.15%	1.58E-05	0.15%	6.44E-05	0.15%	1.11E-05	3.62E-06	1.47E-05
Ethylbenzene	106.17	4.41E-06	0.01%	1.44E-06	0.01%	5.84E-06	0.01%	1.01E-06	3.28E-07	1.33E-06
m-Xylene	106.16	1.05E-06	0.00%	3.44E-07	0.00%	1.40E-06	0.00%	2.40E-07	7.85E-08	3.19E-07
p-Xylene	106.16	4.90E-06	0.02%	1.60E-06	0.02%	6.50E-06	0.02%	1.12E-06	3.65E-07	1.48E-06
o-Xylene	106.16	8.50E-07	0.00%	2.78E-07	0.00%	1.13E-06	0.00%	1.94E-07	6.34E-08	2.58E-07
VOC Total	--	**0.03**	**100.00%**	**0.01**	**100.00%**	**0.04**	**100.00%**	**0.01**	**2.36E-03**	**9.58E-03**
HAP Total	--	**1.36E-03**	**4.30%**	**4.44E-04**	**4.30%**	**1.80E-03**	**4.30%**	**3.11E-04**	**1.01E-04**	**4.12E-04**

Vapor Molecular Weight: 60.83

APPENDIX C: VENDOR SPECIFICATION SHEETS

DOOSAN / PSI

21.9L

	Rev:	A				
	Units		21.9L			
	Std	Metric	1500		1800	
General Engine Data						
Type	N/A		V-type 4 cycle			
Number of cylinders	N/A		12			
Aspiration	N/A		Turbo Charge Air Cooled			
Bore	in	mm	5.04	128	5.04	128
Stroke	in	mm	5.59	142	5.59	142
Displacement	in^3	L	1338	21.9	1338	21.9
Compression Ratio	N/A		10.5			
Mean Piston Speed	ft/min	m/s	1398	7.1	1677	8.52
Gross Standby Power Rating[1,2,3] Per ISO 3046 at the Flywheel						
NG	Hp	kW	507	378	612	456
LP	Hp	kW	370	276	471	351
MEP (@ rated Load on NG)	psi	bar	200	13.8	201	13.9
MEP (@ rated Load on LP)	psi	bar	146	10.1	155	10.7
Gross Prime Power Rating[1,2,3] Per ISO 3046 at the Flywheel						
NG	Hp	kW	469	350	550	410
LP	Hp	kW	N/A	N/A	N/A	N/A
MEP (@ rated Load on NG)	psi	bar	185	12.8	181	12.5
MEP (@ rated Load on LP)	psi	bar	N/A	N/A	N/A	N/A
RPM Range (Min-Max)	RPM		1500-1800			
Rotation Viewed from Flywheel	N/A		Counter Clockwise			
Firing Order	N/A		1-12-5-8-3-10-6-7-2-11-4-9			
Dry Weight						
Fan to Flywheel	lb	kg	3638	1650	3638	1650
Rad to Flywheel	lb	kg	5238	2376	5238	2376
Wet Weight						
Fan to Flywheel	lb	kg	3813	1706	3813	1706
Rad to Flywheel	lb	kg	5760	2620	5760	2620
CG						
Distance from FW housing	in	mm	24	602	24	602
Distance above center of crankshaft	in	mm	7	182	7	182
Engine Mounting						
Maximum Allowable Bending Moment at Rear of Block	lb ft	N m	4425	6000	4425	6000
Moment of Inertia About Roll Axis	lb ft^2	kg m^2				
Flywheel housing	N/A		SAE No.1			
Flywheel	N/A		No. 14			
Number of Flywheel Teeth	N/A		160			
Exhaust System						
Type			Water Cooled Manifold			
Maximum allowable Back pressure	in HG	kPa	3	10.2	3	10.2
Standard Catalyst Back pressure	in HG	kPa	1.5	5.1	1.5	5.1
Exhaust Outlet Pipe Size						
Maximum Turbine Inlet Temperature	F	C	1382	750	1382	750
Exhaust Flow at Rated Power	lb/hr	kg/hr	3184	1444	4038	1832
Exhaust Flow at Rated Power @1350F	cfm	m^3/min	2427	68.7	2995	84.8
Air Induction System						
Maximum allowable Intake Air Restriction with Air Cleaner						
Clean	inH2O	kPa	5	1.24	5	1.24
Dirty	inH2O	kPa	15	3.74	15	3.74
Combustion Air required (entire engine)	lb/hr	kg/hr	3004	1362	3810	1728
Combustion Air required (entire engine)	cfm	m^3/min	763	22	968	27

	Rev:	A				
	Units		21.9L			
	Std	Metric	1500		1800	
Electrical System						
Minimum Recommended Battery Capacity	AH		200			
Cold Cranking Current						
Engine only	CCA		1000			
Engine with Drive train	CCA		1000			
Maximum Allowable Resistance of Starting Circuit	Ohms		0.002			
Starting Motor Power	HP	kW	9.4	7	9.4	7
Battery Charging Alternator						
Voltage	Volts		24			
Current	Amps		45			
Coil primary Resistance	Ohms		0.59Ω ± 10%			
Spark Plug p/n			IFR7F-4D			
Spark plug gap	inches	mm	.015" (-0/+.008") .38mm (-0/+.2mm)			
Cooling System						
Coolant Capacity						
Engine only	gal	L	11.5	52.3	11.5	52.3
Engine with Radiator	gal	L	50.1	228	50.1	228
Engine Coolant Flow	gal/min	L/min	145	550	174	660
Water Pump Speed	RPM		2547		3056	
Heat rejected to Cooling water at rated Load	btu/min	kcal/sec	21451	90.1	25760	108.2
Maximum Intake Air Temperature (IAT)	F	C	155	68	155	68
ECU IAT Warning	F	C	140	60	140	60
ECU IAT Shutdown	F	C	155	69	155	69
Maximum Coolant Friction Head External to the engine	psi	bar	5.8	0.4	5.8	0.4
Maximum Air Restriction Across a Radiator	inH2O	mmH2O	0.5	12.8	0.5	12.8
Standard Thermostat Range						
Cracking Temperature	F	C	160	71	160	71
Full Open Temperature	F	C	185	85	185	85
Maximum Allowable Pressure Cap	psi	bar	14.7	1	14.7	1
Ambient Clearance Open Genset (water) (Air-to-Boil)						
Specified	F	C	142	61	142	61
Acutal	F	C			142	61
Ambient Clearance (Oil)						
Specified	F	C	142	61	142	61
Acutal	F	C			144	62
CAC Rise over Ambient (Charge)						
Specified	F	C	15	9	15	9
Acutal	F	C			11	6
Maximum Allowable Top Tank Temperature	F	C	230	110	230	110
ECU Warning	F	C	220	104	220	104
ECU Shutdown	F	C	230	110	230	110
Fan Power	HP	kW	24	17.9	42	31.3
Fan Diameter, including blades	in	mm	52	1321	52	1321
Fan Speed	RPM		1200		1440	
Cooling Fan Air Flow @ 1" Static H2O Pressure and 125F @ radiator	CFM	m^3/min	34,286	971	40,000	1,133
Charge Air Cooler						
Compressor Outlet Temperature	F	C	246	120	300	150
Compressor Flow Rate per CAC	lb/hr	kg/hr	1592	722	2019	916
Heat Rejection per CAC	btu/min	kW	TBD		3040	53.5

DOOSAN / PSI

21.9L

	Rev:	A				
	Units		21.9L			
	Std	Metric	1500		1800	
Lubrication System						
Oil Specification			SAE 15W-40 Low Ash Gas engine oil (.25-.5% by wt), API CD/CF or higher			
Oil Pressure						
Idle						
Min	Psi	Bar	13	0.9	13	0.9
Max	Psi	Bar	43.5	3	43.5	3
Rated Speed						
Min	Psi	Bar	43.5	3	43.5	3
Max	Psi	Bar	94.5	6.5	94.5	6.5
Maximum Allowable Oil Temperature	F	C	250	121	250	121
Engine Oil Capacity						
Min	Qts	L	34.75	33	34.75	33
Max	Qts	L	42.25	40	42.25	40
Oil Filter Capacity	Qts	L	7.5	7.1	7.5	7.1
ECU Oil Pressure Warning[5]	psi		30			
ECU Oil Pressure Shut Down[5]	psi		25			
Fuel System						
Fuel Consumption[6]						
NG	Ft^3/hr	kg/hr	3779	86	4230	96
LP	Ft^3/hr	kg/hr	1186	63	1408	75
Maximum EPR Rated Pressure	psi	kPa	1.0	6.9	1.0	6.9
Maximum Running pressure to Electronic Pressure Regulator (EPR)	inH2O	kPa	11.0	2.7	11.0	2.7
Minimum Running pressure to EPR	inH2O	kPa	7.0	1.7	7.0	1.7
Minimum Gas Supply Pipe Size			2 x 2" NPT			
Maximum EPR Rated Pressure	psi	kPa	1.0	6.9	1.0	6.9
Maximum Running Pressure to EPR	inH2O	kPa	11.0	2.7	11.0	2.7
Minimum Running Pressure to EPR	inH2O	kPa	7.0	1.7	7.0	1.7
Minimum LPG Supply Pipe Size[4]			2 x 2" NPT			

[1] Standby and overload ratings based on ISO3046.

[2] All ratings are gross flywheel horsepower corrected to 77°F at an altitude of 328feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.

[3] Production tolerances in engines and installed components can account for power variations of +/- 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

[4] The preceeding pipe sizes are only suggestions and piping sizes may vary with temperature, pressure, distance from supply and application of local codes. Gas must be available at adequate volume and pressure for engine at the EPR.

[5] >1400RPM

[6] See PSI HD Technical Spec. 56300002 - Fuel Specification

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2015 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Power Solutions International, Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: **FPSIB21.9NGP-018**

Effective Date: 11/12/2014

Expiration Date: 12/31/2015

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/12/2014

Revision Date: N/A

Manufacturer: Power Solutions International, Inc.
Engine Family: FPSIB21.9NGP
Certification Type: Mobile and Stationary
Fuel : Natural Gas (CNG/LNG)
LPG/Propane
Emission Standards : NMHC + NOx (g/kW-hr) : 2.7
HC + NOx (g/kW-hr) : 2.7
CO (g/kW-hr) : 4.4CO (g/Hp-hr) : 2
NOx (g/Hp-hr) : 1
VOC (g/Hp-hr) : 0.7
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 1048, 40 CFR Part 60, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 1048, 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 1048, 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 1048, 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 1048, 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 1048, 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

Compressor Data:

Elevation,ft:	2500.00	Barmtr,psia:	13.400	Ambient,°F:	100.00	Type:	Nat. Gas
Frame: **(ELP)**	JGK/4	Stroke, in:	5.50	Rod Dia, in:	2.000	Mfg:	Waukesha
Max RL Tot, lbf:	74000	Max RL Tens, lbf:	37000	Max RL Comp, lbf:	40000	Model:	L5794GSI
Rated RPM:	1200	Rated BHP:	2540.0	Rated PS FPM:	1100.0	BHP:	1347 (2.38%)
Calc RPM:	1200.0	BHP:	1292	Calc PS FPM:	1100.0	Avail:	1292 (55)

Driver Data:

Services	**Service 1**				
Gas Model	VMG				
Stage Data:	**1**	---	**2**	**3**	
Target Flow, MMSCFD	5.000	---	5.000	5.000	
Flow Calc, MMSCFD	5.611	---	5.611	5.577	
BHP per Stage	483.8	---	397.2	387.2	
Specific Gravity	0.8799	---	0.8799	0.8815	
Ratio of Sp Ht (N)	1.2012	---	1.2030	1.2255	
Comp Suct (Zs)	0.9875	---	0.9622	0.8880	
Comp Disch (Zd)	0.9760	---	0.9408	0.8596	
Pres Suct Line, psig	20.00	---	N/A	N/A	
Pres Suct Flg, psig	19.67	---	118.25	374.64	
Pres Disch Flg, psig	121.55	---	381.94	1212.13	
Pres Disch Line, psig	N/A	---	N/A	1200.00	
Pres Ratio F/F	4.081	---	3.003	3.158	
Temp Suct, °F	70.00	---	120.00	120.00	
Temp Clr Disch, °F	120.00	---	120.00	120.00	
Cylinder Data:	**Throw 1**	**Throw 3**	**Throw 4**	**Throw 2**	
Cyl Model	17-7/8K	17-7/8K	11K	7-1/4K	
Cyl Bore, in	17.375	17.375	11.000	6.750	
Cyl RDP (API), psig	404.5	404.5	768.2	1727.3	
Cyl MAWP, psig	445.0	445.0	845.0	1900.0	
Cyl Action	DBL	DBL	DBL	DBL	
Cyl Disp, CFM	1799.2	1799.2	713.9	261.4	
Pres Suct Intl, psig	16.36	16.36	106.34	339.99	
Temp Suct Intl, °F	80	80	126	126	
Pres Disch Intl, psig	134.28	134.28	414.48	1327.47	
Temp Disch Intl, °F	246	246	267	289	
HE Suct Gas Vel, FPM	8792	8792	8688	8509	
HE Disch Gas Vel, FPM	8091	8091	7604	8099	
HE Spcrs Used/Max	0/6	0/6	0/4	0/4	
HE Vol Pkt Avail	0.94+59.76	0.94+59.76	0.75+43.43	0.69+49.49	
Vol Pkt Used	4.10 (V) %	4.10 (V) %	0.00 (V) %	0.00 (V) %	
HE Min Clr, %	17.56	17.56	17.50	20.78	
HE Total Clr, %	20.94	20.94	18.26	21.46	
CE Suct Gas Vel, FPM	8676	8676	8400	7762	
CE Disch Gas Vel, FPM	7983	7983	7353	7388	
CE Spcrs Used/Max	0/6	0/6	0/4	0/4	
CE Min Clr, %	18.18	18.18	18.73	24.04	
CE Total Clr, %	18.18	18.18	18.73	24.04	
Suct Vol Eff HE/CE, %	45.4/51.6	45.4/51.6	65.8/65.0	57.7/53.3	
Disch Event HE/CE, ms	5.6/7.2	5.6/7.2	7.9/9.3	7.2/8.2	
Suct Pseudo-Q HE/CE	10.8/10.7	10.8/10.7	8.8/8.3	11.6/9.7	
Gas Rod Ld Comp, %	70.1 C	70.1 C	74.2 C	91.7 C	
Gas Rod Ld Tens, %	74.4 T	74.4 T	75.5 T	83.6 T	
Gas Rod Ld Total, %	75.1	75.1	77.8	91.4	
Xhd Pin Deg/%Rvrsl lbf	166/86.0	156/83.1	177/93.7	180/88.1	
Flow Calc, MMSCFD	2.806	2.806	5.611	5.577	
Cyl BHP	241.9	241.9	397.2	387.2	

Compressor Data:

						Driver Data:	
Elevation,ft:	2500.00	Barmtr,psia:	13.400	Ambient,°F:	100.00	Type:	Nat. Gas
Frame: **(ELP)**	JGK/4	Stroke, in:	5.50	Rod Dia, in:	2.000	Mfg:	Waukesha
Max RL Tot, lbf:	74000	Max RL Tens, lbf:	37000	Max RL Comp, lbf:	40000	Model:	L5794GSI
Rated RPM:	1200	Rated BHP:	2540.0	Rated PS FPM:	1100.0	BHP:	1347 (2.38%)
Calc RPM:	1200.0	BHP:	1292	Calc PS FPM:	1100.0	Avail:	1292 (55)

Services	**Service 1**			
Gas Model	VMG			
Stage Data:	**1**	---	**2**	**3**
Target Flow, MMSCFD	5.000	---	5.000	5.000
Flow Calc, MMSCFD	5.962	---	5.962	5.934
BHP per Stage	475.2	---	407.0	386.0
Specific Gravity	0.8802	---	0.8802	0.8814
Ratio of Sp Ht (N)	1.2028	---	1.2037	1.2259
Comp Suct (Zs)	0.9856	---	0.9609	0.8890
Comp Disch (Zd)	0.9737	---	0.9399	0.8601
Pres Suct Line, psig	25.00	---	N/A	N/A
Pres Suct Flg, psig	24.62	---	122.48	371.14
Pres Disch Flg, psig	126.00	---	378.37	1111.13
Pres Disch Line, psig	N/A	---	N/A	1100.00
Pres Ratio F/F	3.667	---	2.883	2.924
Temp Suct, °F	70.00	---	120.00	120.00
Temp Clr Disch, °F	120.00	---	120.00	120.00
Cylinder Data:	**Throw 1**	**Throw 3**	**Throw 4**	**Throw 2**
Cyl Model	17-7/8K	17-7/8K	11K	7-1/4K
Cyl Bore, in	17.375	17.375	11.000	6.750
Cyl RDP (API), psig	404.5	404.5	768.2	1727.3
Cyl MAWP, psig	445.0	445.0	845.0	1900.0
Cyl Action	DBL	DBL	DBL	DBL
Cyl Disp, CFM	1799.2	1799.2	713.9	261.4
Pres Suct Intl, psig	20.80	20.80	110.16	336.83
Temp Suct Intl, °F	79	79	126	125
Pres Disch Intl, psig	139.41	139.41	410.88	1218.40
Temp Disch Intl, °F	234	234	262	278
HE Suct Gas Vel, FPM	8792	8792	8688	8509
HE Disch Gas Vel, FPM	8091	8091	7604	8099
HE Spcrs Used/Max	0/6	0/6	0/4	0/4
HE Vol Pkt Avail	0.94+59.76	0.94+59.76	0.75+43.43	0.69+49.49
Vol Pkt Used	20.87 (V) %	20.87 (V) %	0.00 (V) %	0.00 (V) %
HE Min Clr, %	17.56	17.56	17.50	20.78
HE Total Clr, %	30.97	30.97	18.26	21.46
CE Suct Gas Vel, FPM	8676	8676	8400	7762
CE Disch Gas Vel, FPM	7983	7983	7353	7388
CE Spcrs Used/Max	0/6	0/6	0/4	0/4
CE Min Clr, %	18.18	18.18	18.73	24.04
CE Total Clr, %	18.18	18.18	18.73	24.04
Suct Vol Eff HE/CE, %	32.1/57.4	32.1/57.4	67.6/66.9	61.7/57.7
Disch Event HE/CE, ms	4.9/7.9	4.9/7.9	8.2/9.6	7.8/8.9
Suct Pseudo-Q HE/CE	9.9/10.7	9.9/10.7	8.9/8.3	11.6/9.7
Gas Rod Ld Comp, %	70.5 C	70.5 C	72.5 C	82.1 C
Gas Rod Ld Tens, %	74.7 T	74.7 T	73.6 T	74.4 T
Gas Rod Ld Total, %	75.5	75.5	76.0	81.6
Xhd Pin Deg/%Rvrsl lbf	178/95.6	168/90.4	176/93.9	174/93.6
Flow Calc, MMSCFD	2.981	2.981	5.962	5.934
Cyl BHP	237.6	237.6	407.0	386.0

Compressor Data:						Driver Data:	
Elevation,ft:	2500.00	Barmtr,psia:	13.400	Ambient,°F:	100.00	Type:	Nat. Gas
Frame: **(ELP)**	JGK/4	Stroke, in:	5.50	Rod Dia, in:	2.000	Mfg:	Waukesha
Max RL Tot, lbf:	74000	Max RL Tens, lbf:	37000	Max RL Comp, lbf:	40000	Model:	L5794GSI
Rated RPM:	1200	Rated BHP:	2540.0	Rated PS FPM:	1100.0	BHP:	1347 (2.38%)
Calc RPM:	1200.0	BHP:	1292	Calc PS FPM:	1100.0	Avail:	1292 (55)

Services	**Service 1**			
Gas Model	VMG			
Stage Data:	**1**	---	**2**	**3**
Target Flow, MMSCFD	5.000	---	5.000	5.000
Flow Calc, MMSCFD	6.029	---	6.029	6.005
BHP per Stage	445.8	---	418.5	403.9
Specific Gravity	0.8805	---	0.8805	0.8815
Ratio of Sp Ht (N)	1.2043	---	1.2038	1.2267
Comp Suct (Zs)	0.9838	---	0.9599	0.8841
Comp Disch (Zd)	0.9716	---	0.9381	0.8564
Pres Suct Line, psig	30.00	---	N/A	N/A
Pres Suct Flg, psig	29.57	---	125.78	388.20
Pres Disch Flg, psig	129.71	---	396.17	1212.13
Pres Disch Line, psig	N/A	---	N/A	1200.00
Pres Ratio F/F	3.331	---	2.943	3.052
Temp Suct, °F	70.00	---	120.00	120.00
Temp Clr Disch, °F	120.00	---	120.00	120.00
Cylinder Data:	**Throw 1**	**Throw 3**	**Throw 4**	**Throw 2**
Cyl Model	17-7/8K	17-7/8K	11K	7-1/4K
Cyl Bore, in	17.375	17.375	11.000	6.750
Cyl RDP (API), psig	404.5	404.5	768.2	1727.3
Cyl MAWP, psig	445.0	445.0	845.0	1900.0
Cyl Action	DBL	DBL	DBL	DBL
Cyl Disp, CFM	1799.2	1799.2	713.9	261.4
Pres Suct Intl, psig	25.24	25.24	113.15	352.18
Temp Suct Intl, °F	78	78	126	126
Pres Disch Intl, psig	143.73	143.73	430.10	1328.51
Temp Disch Intl, °F	223	223	265	285
HE Suct Gas Vel, FPM	8792	8792	8688	8509
HE Disch Gas Vel, FPM	8091	8091	7604	8099
HE Spcrs Used/Max	0/6	0/6	0/4	0/4
HE Vol Pkt Avail	0.94+59.76	0.94+59.76	0.75+43.43	0.69+49.49
Vol Pkt Used	41.93 (V) %	41.93 (V) %	0.00 (V) %	0.00 (V) %
HE Min Clr, %	17.56	17.56	17.50	20.78
HE Total Clr, %	43.55	43.55	18.26	21.46
CE Suct Gas Vel, FPM	8676	8676	8400	7762
CE Disch Gas Vel, FPM	7983	7983	7353	7388
CE Spcrs Used/Max	0/6	0/6	0/4	0/4
CE Min Clr, %	18.18	18.18	18.73	24.04
CE Total Clr, %	18.18	18.18	18.73	24.04
Suct Vol Eff HE/CE, %	17.9/62.2	17.9/62.2	66.7/65.9	59.6/55.4
Disch Event HE/CE, ms	3.8/8.6	3.8/8.6	8.1/9.4	7.5/8.6
Suct Pseudo-Q HE/CE	7.8/10.8	7.8/10.8	8.9/8.3	11.7/9.7
Gas Rod Ld Comp, %	70.5 C	70.5 C	76.4 C	90.8 C
Gas Rod Ld Tens, %	74.6 T	74.6 T	77.6 T	82.6 T
Gas Rod Ld Total, %	75.4	75.4	80.1	90.3
Xhd Pin Deg/%Rvrsl lbf	180/99.5	169/93.1	178/96.1	180/87.5
Flow Calc, MMSCFD	3.014	3.014	6.029	6.005
Cyl BHP	222.9	222.9	418.5	403.9

Compressor Data:						**Driver Data:**	
Elevation,ft:	2500.00	Barmtr,psia:	13.400	Ambient,°F:	100.00	Type:	Nat. Gas
Frame: **(ELP)**	JGK/4	Stroke, in:	5.50	Rod Dia, in:	2.000	Mfg:	Waukesha
Max RL Tot, lbf:	74000	Max RL Tens, lbf:	37000	Max RL Comp, lbf:	40000	Model:	L5794GSI
Rated RPM:	1200	Rated BHP:	2540.0	Rated PS FPM:	1100.0	BHP:	1347 (2.38%)
Calc RPM:	1200.0	BHP:	1082	Calc PS FPM:	1100.0	Avail:	1292 (55)

Services	**Service 1**			
Gas Model	VMG			
Stage Data:	**1**	---	**2**	**3**
Target Flow, MMSCFD	5.000	---	5.000	5.000
Flow Calc, MMSCFD	5.000	---	5.000	4.975
BHP per Stage	421.7	---	336.3	300.3
Specific Gravity	0.8802	---	0.8802	0.8815
Ratio of Sp Ht (N)	1.2021	---	1.2050	1.2285
Comp Suct (Zs)	0.9856	---	0.9576	0.8809
Comp Disch (Zd)	0.9728	---	0.9356	0.8536
Pres Suct Line, psig	25.00	---	N/A	N/A
Pres Suct Flg, psig	24.62	---	133.93	399.24
Pres Disch Flg, psig	137.44	---	406.47	1111.13
Pres Disch Line, psig	N/A	---	N/A	1100.00
Pres Ratio F/F	3.968	---	2.850	2.725
Temp Suct, °F	70.00	---	120.00	120.00
Temp Clr Disch, °F	120.00	---	120.00	120.00
Cylinder Data:	**Throw 1**	**Throw 3**	**Throw 4**	**Throw 2**
Cyl Model	17-7/8K	17-7/8K	11K	7-1/4K
Cyl Bore, in	17.375	17.375	11.000	6.750
Cyl RDP (API), psig	404.5	404.5	768.2	1727.3
Cyl MAWP, psig	445.0	445.0	845.0	1900.0
Cyl Action	DBL	DBL	DBL	DBL
Cyl Disp, CFM	1799.2	1799.2	713.9	261.4
Pres Suct Intl, psig	20.80	20.80	120.52	362.06
Temp Suct Intl, °F	79	79	126	125
Pres Disch Intl, psig	151.79	151.79	441.49	1220.42
Temp Disch Intl, °F	243	243	261	269
HE Suct Gas Vel, FPM	8792	8792	8688	8509
HE Disch Gas Vel, FPM	8091	8091	7604	8099
HE Spcrs Used/Max	0/6	0/6	0/4	0/4
HE Vol Pkt Avail	0.94+59.76	0.94+59.76	0.75+43.43	0.69+49.49
Vol Pkt Used	23.27 (V) %	23.27 (V) %	50.00 (V) %	50.00 (V) %
HE Min Clr, %	17.56	17.56	17.50	20.78
HE Total Clr, %	32.40	32.40	39.97	46.21
CE Suct Gas Vel, FPM	8676	8676	8400	7762
CE Disch Gas Vel, FPM	7983	7983	7353	7388
CE Spcrs Used/Max	0/6	0/6	0/4	0/4
CE Min Clr, %	18.18	18.18	18.73	24.04
CE Total Clr, %	18.18	18.18	18.73	24.04
Suct Vol Eff HE/CE, %	22.0/53.1	22.0/53.1	36.8/67.4	32.3/61.6
Disch Event HE/CE, ms	3.9/7.4	3.9/7.4	6.0/9.7	5.7/9.4
Suct Pseudo-Q HE/CE	8.5/10.7	8.5/10.7	8.3/8.3	10.5/9.8
Gas Rod Ld Comp, %	77.9 C	77.9 C	77.4 C	80.2 C
Gas Rod Ld Tens, %	82.6 T	82.6 T	78.5 T	72.1 T
Gas Rod Ld Total, %	83.4	83.4	81.1	79.4
Xhd Pin Deg/%Rvrsl lbf	180/96.7	169/96.5	175/87.0	179/79.9
Flow Calc, MMSCFD	2.500	2.500	5.000	4.975
Cyl BHP	210.8	210.8	336.3	300.3

May 25, 2016

Emission Control Application Data Sheet

Maxim Silencers
10635 Brighton Lane
Stafford, Texas 77477
Phone: 832 554-0980
Fax: 832 554-0990

Customer: **BIDELL** Project: **NORTH DAKOTA - GE VHP L5795GSI** Date: **1/26/2017**

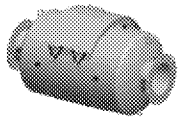
Customer Contact **STEVE WATSON** Maxim Contact: **AARON HUFF / ROBERT GASIENICA** Order/Quote #: **Q01154AH**

Engine Data:

Engine Model:	**Waukesha L5794GSI**		Speed:	**1200**	RPM
Fuel & Operating Type:	**Natural Gas Rich Burn**		Engine Power:	**1380** **1029**	Hp KW
Exhaust Flow Rate:	**6379** **10838** **9497**	**acfm** **m^3/hr** **lbs/hr**	Exhaust Temperature:	**1136** **613**	°F °C

Catalyst Data:

Number of Core layers:	**1**					
Model:	**QAC6-53-14**			Inlet Size:	**14**	in
Grade:	**Hospital Plus**			Outlet Size:	**14**	in
Body Diameter:	**40**	in		Body Length:	**141**	in
Estimated weight:	**1374** **623**	lbs Kg		Estimated Back Pressure of the unit:	**7.21** **18.0**	in of WC mbar
Core Part Number:	**PE2-530**		Qty **1**	Speed through inlet:	**6176**	ft/min
Cell Density	300	cpsi		Back Pressure across Element(s) only	2.87 7.2	in of WC mbar



Emission:

Min. Temp. at Core Face: **1112** °F **600** °C
Max. Temp. at Core Face: **1239** °F **671** °C

Catalyst Type: **3-Way**

O_2 in Exhaust vol %
H_2O in Exhaust vol %

	Pollutant					
	NOx	CO	NMHC/VOC	CH_2O/CHCO	ORGANIC PM10	
Engine Out / Pre Emission:	**14**	**8.5**	**0.05**	**0.05**	**0**	g/bhp-hr
	5275.52	**3203.00**	**18.84**	**18.84**	**0.00**	mg/Nm3
Post Emission:	**0.910**	**0.217**	**0.009**	**0.003**	**0.000**	g/bhp-hr
	342.91	**81.72**	**3.26**	**1.15**	**0.00**	mg/Nm3
	93.5	***97.4***	***82.7***	***93.9***	***50.0***	% Reduction
	2.77	0.66	0.03	0.01		lb/hr
	12.13	2.89	0.12	0.04		tons/year operation **8760** hr/year
	197.8	47.1	1.9	0.7		ppmv
						ppmvd @ 15% O2

Acoustics:

Frequency Band (Hz):	31.5	63	125	250	500	1000	2000	4000	8000	
Raw Noise SPL (dB) at 3.28 ft.:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	7 dBA
Estimated Attenuation (dB):	**10**	**21**	**45**	**42**	**38**	**39**	**40**	**40**	**40**	No Element
Plus:	**10**	**22**	**47**	**44**	**42**	**44**	**46**	**46**	**45**	One Element Layer
Silenced SPL (dB) at 3.28 ft.:	**-10**	**-22**	**-47**	**-44**	**-42**	**-44**	**-46**	**-46**	**-45**	-37.2 dBA

Warranty & Notes:

- **If Pre-Emission levels are not as noted above, contact Maxim Silencers for a re-quote.**
- To achieve Post Emissions levels detailed above, exhaust temperature and Pre-Emission data must be as specified.
- Maximum allowable exhaust temperature at core face is 1350°F.
- If applicable, the engine will require an air/fuel ratio controller to meet above emission levels. For Rich Burn engines λ must be 0.96 - 0.99.
- Catalyst cleaning/regeneration required, if initial backpressure increases by 2" of WC.
- Engine operation to be stable and reproducible.
- QAC is not designed to withstand a backfire, therefore measures should be taken prior to QAC unit to alleviate backfire pressure.
- Maximum lubrication oil consumption rate to be less than 0.0015 lb/bhp/hr.
- Lube oil sulfate ash contents should not exceed 0.5%.
- Phosphorus and/or Zinc should not exceed 5 ppmv in the exhaust stream.
- A high temperature alarm/shutdown to be maintained at downstream of catalyst at 1300°F.
- Fuel not to contain heavy or transition metals such as Pb, Ar, Zn, Cu, Sn, Fe, Ba, Ni, Cr etc.
- Chlorinated or Silicone containing compounds in the exhaust not to exceed 1 ppmv.
- Sulfur compounds in the exhaust gas stream not to exceed 25 ppmv.
- Performance guarantee is voided should the catalyst become masked or de-activated by any contaminant in the exhaust stream.
- Engine to be maintained and operated in accordance within manufacturer's recommended practice.
- Under no condition will Maxim Silencers assume any contingent liabilities.
- Operating manual is available online at www.maximsilencers.com or contact a Maxim sales representative.
- Nomenclature: QAC4-292-8, 4 is grade (Super Critical), 29 is catalyst block size, 2 is no. of catalyst(s) and 8 is flange diameter.
- Organic PM10 are estimate only and not a guarantee because of the variability in fuels and additives which change PM10.
- Maxim's standard one year warranty applies.

Rev level: 86

GE Power

13-751 - Clarks Creek

Targa Badlands

VHP - L5794GSI

Gas Compression

ENGINE SPEED (rpm):	1200	NOx SELECTION (g/bhp-hr):	Customer Catalyst
DISPLACEMENT (in3):	5788	COOLING SYSTEM:	JW, IC + OC
COMPRESSION RATIO:	8.2:1	INTERCOOLER WATER INLET (°F):	130
IGNITION SYSTEM:	ESM	JACKET WATER OUTLET (°F):	180
EXHAUST MANIFOLD:	Water Cooled	JACKET WATER CAPACITY (gal):	107
COMBUSTION:	Rich Burn, Turbocharged	AUXILIARY WATER CAPACITY (gal):	11
ENGINE DRY WEIGHT (lbs):	24760	LUBE OIL CAPACITY (gal):	190
AIR/FUEL RATIO SETTING:	0.38% CO	MAX. EXHAUST BACKPRESSURE (in. H2O):	18
ENGINE SOUND LEVEL (dBA)	102	MAX. AIR INLET RESTRICTION (in. H2O):	15
		EXHAUST SOUND LEVEL (dBA)	111

SITE CONDITIONS:

FUEL:	Natural Gas	ALTITUDE (ft):	2500
FUEL PRESSURE RANGE (psig):	30 - 60	MAXIMUM INLET AIR TEMPERATURE (°F):	95
FUEL HHV (BTU/ft3):	1,035.2	FUEL WKI:	91.8
FUEL LHV (BTU/ft3):	935.8		

SITE SPECIFIC TECHNICAL DATA

POWER RATING	UNITS	110% OVERLOAD SITE DATA (See note 18)	MAX RATING AT 100 °F AIR TEMP	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE OF 95 °F		
				100%	75%	55%
CONTINUOUS ENGINE POWER	BHP	1518	1380	1380	1035	763
OVERLOAD	% 2/24 hr	Note 18	10	10	-	-
MECHANICAL EFFICIENCY (LHV)	%	33.5	33.3	33.3	31.8	29.6
CONTINUOUS POWER AT FLYWHEEL	BHP	1518	1380	1380	1035	763
based on no auxiliary engine driven equipment						
FUEL CONSUMPTION						
FUEL CONSUMPTION (LHV)	BTU/BHP-hr	7597	7645	7645	8008	8616
FUEL CONSUMPTION (HHV)	BTU/BHP-hr	8404	8456	8456	8859	9531
FUEL FLOW *based on fuel analysis LHV*	SCFM	205	188	188	148	117
HEAT REJECTION						
JACKET WATER (JW)	BTU/hr x 1000	3308	3088	3074	2583	2161
LUBE OIL (OC)	BTU/hr x 1000	496	477	475	436	405
INTERCOOLER (IC)	BTU/hr x 1000	199	188	177	94	47
EXHAUST	BTU/hr x 1000	3245	2884	2896	2147	1635
RADIATION	BTU/hr x 1000	646	605	620	554	512
EMISSIONS (ENGINE OUT):						
NOx (NO + NO2)	g/bhp-hr	13.9	14.0	14.0	23.6	25.1
CO	g/bhp-hr	8.5	8.5	8.5	7.0	6.6
THC	g/bhp-hr	1.8	1.8	1.8	1.8	1.8
NMHC	g/bhp-hr	0.29	0.27	0.27	0.31	0.38
NM,NEHC (VOC)	g/bhp-hr	0.05	0.05	0.05	0.05	0.07
CO2	g/bhp-hr	471	473	473	496	534
CO2e	g/bhp-hr	514	514	514	542	590
CH2O	g/bhp-hr	0.05	0.05	0.05	0.05	0.05
CH4	g/bhp-hr	1.63	1.55	1.55	1.75	2.14
AIR INTAKE / EXHAUST GAS						
INDUCTION AIR FLOW	SCFM	2189	2003	2003	1588	1263
EXHAUST GAS MASS FLOW	lb/hr	9831	8993	8993	7133	5673
EXHAUST GAS FLOW *at exhaust temp, 14.5 psia*	ACFM	7078	6379	6379	4860	3754
EXHAUST TEMPERATURE	°F	1160	1136	1136	1073	1029

HEAT EXCHANGER SIZING[12]			
TOTAL JACKET WATER CIRCUIT (JW)	BTU/hr x 1000	3752	3502
TOTAL AUXILIARY WATER CIRCUIT (IC + OC)	BTU/hr x 1000	787	755

COOLING SYSTEM WITH ENGINE MOUNTED WATER PUMPS		
JACKET WATER PUMP MIN. DESIGN FLOW	GPM	450
JACKET WATER PUMP MAX. EXTERNAL RESTRICTION	psig	16
AUX WATER PUMP MIN. DESIGN FLOW	GPM	79
AUX WATER PUMP MAX. EXTERNAL RESTRICTION	psig	44

All data provided per the condtions listed in the notes section on page three.

Data Generated by EngCalc Program Version 3.6.Dresser Inc.

1/25/2017 3:25 PM

13-751 - Clarks Creek

Targa Badlands

VHP - L5794GSI

Gas Compression

FUEL COMPOSITION

HYDROCARBONS:		Mole or Volume %
Methane	CH4	93
Ethane	C2H6	4
Propane	C3H8	1
Iso-Butane	I-C4H10	0
Normal Butane	N-C4H10	0
Iso-Pentane	I-C5H12	0
Normal Pentane	N-C5H12	0
Hexane	C6H14	0
Heptane	C7H16	0
Ethene	C2H4	0
Propene	C3H6	0
	SUM HYDROCARBONS	98
NON-HYDROCARBONS:		
Nitrogen	N2	0
Oxygen	O2	0
Helium	He	0
Carbon Dioxide	CO2	2
Carbon Monoxide	CO	0
Hydrogen	H2	0
Water Vapor	H2O	0
	TOTAL FUEL	100

FUEL:	Natural Gas
FUEL PRESSURE RANGE (psig):	30 - 60
FUEL WKI:	91.8
FUEL SLHV (BTU/ft3):	919.50
FUEL SLHV (MJ/Nm3):	36.16
FUEL LHV (BTU/ft3):	935.78
FUEL LHV (MJ/Nm3):	36.80
FUEL HHV (BTU/ft3):	1035.15
FUEL HHV (MJ/Nm3):	40.71
FUEL DENSITY (SG):	0.60

Standard Conditions per ASTM D3588-91 [60°F and 14.696psia] and ISO 6976:1996-02-01[25, V(0;101.325)].
Based on the fuel composition, supply pressure and temperature, liquid hydrocarbons may be present in the fuel. No liquid hydrocarbons are allowed in the fuel. The fuel must not contain any liquid water. Waukesha recommends both of the following:
1) Dew point of the fuel gas to be at least 20°F (11°C) below the measured temperature of the gas at the inlet of the engine fuel regulator.
2) A fuel filter separator to be used on all fuels except commercial quality natural gas.
Refer to the 'Fuel and Lubrication' section of 'Technical Data' or contact the Waukesha Application Engineering Department for additional information on fuels, or LHV and WKI* calculations.
* Trademark of General Electric Company

FUEL CONTAMINANTS

Total Sulfur Compounds	0	% volume
Total Halogen as Cloride	0	% volume
Total Ammonia	0	% volume
Siloxanes		
Tetramethyl silane	0	% volume
Trimethyl silanol	0	% volume
Hexamethyldisiloxane (L2)	0	% volume
Hexamethylcyclotrisiloxane (D3)	0	% volume
Octamethyltrisiloxane (L3)	0	% volume
Octamethylcyclotetrasiloxane (D4)	0	% volume
Decamethyltetrasiloxane (L4)	0	% volume
Decamethylcyclopentasiloxane (D5)	0	% volume
Dodecamethylpentasiloxane (L5)	0	% volume
Dodecamethylcyclohexasiloxane (D6)	0	% volume
Others	0	% volume

Total Sulfur Compounds	0 µg/BTU
Total Halogen as Cloride	0 µg/BTU
Total Ammonia	0 µg/BTU
Total Siloxanes (as Si)	0 µg/BTU

Calculated fuel contaminant analysis will depend on the entered fuel composition and selected engine model.

NOTES

1. All data is based on engines with standard configurations unless noted otherwise.
2. Power rating is adjusted for fuel, site altitude, and site air inlet temperature, in accordance with ISO 3046/1 with tolerance of ± 3%.
3. Fuel consumption is presented in accordance with ISO 3046/1 with a tolerance of -0 / +5% at maximum rating. Fuel flow calculation based on fuel LHV and fuel consumption with a tolerance of -0/+5 %. For sizing piping and fuel equipment, it is recommended to include the 5% tolerance.
4. Heat rejection tolerances are ± 30% for radiation, and ± 8% for jacket water, lube oil, intercooler, and exhaust energy.
5. Emission levels for engines with GE supplied 3-way catalyst are given at catalyst outlet flange. For all other engine models, emission levels are given at engine exhaust outlet flange prior to any after treatment. Values are based on a new engine operating at indicated site conditions, and adjusted to the specified timing and air/fuel ratio at rated load. Catalyst out emission levels represent emission levels the catalyst is sized to achieve. Manual adjustment may be necessary to achieve compliance as catalyst/engine age. Catalyst-out emission levels are valid for the duration of the engine warranty. Emissions are at an absolute humidity of 75 grains H2O/lb (10.71 g H2O/kg) of dry air. Emission levels may vary subject to instrumentation, measurement, ambient conditions, fuel quality, and engine variation. Engine may require adjustment on-site to meet emission values, which may affect engine performance and heat output. NOx, CO, THC, and NMHC emission levels are listed as a not to exceed limit, all other emission levels are estimated. CO2 emissions based on EPA Federal Register/Vol. 74, No. 209/Friday, October 30, 2009 Rules and Regulations 56398, 56399 (3) Tier 3 Calculation Methodology, Equation C-5.
6. Air flow is based on undried air with a tolerance of ± 7%.
7. Exhaust temperature given at engine exhaust outlet flange with a tolerance of ± 50°F (28°C).
8. Exhaust gas mass flow value is based on a "wet basis" with a tolerance of ± 7%.
9. Inlet air restrictions based on full rated engine load. Exhaust backpressure based on 158 PSI BMEP and 1200 RPM. Refer to the engine specification section of Waukesha's standard technical data for more information.
10. Cooling circuit capacity, lube oil capacity, and engine dry weight values are typical.
11. Fuel must conform to Waukesha's "Gaseous Fuel Specification" S7884-7 or most current version. Fuel may require treatment to meet current fuel specification.
12. Heat exchanger sizing values given as the maximum heat rejection of the circuit, with applied tolerances and an additional 5% reserve factor.
13. Fuel volume flow calculation in english units is based on 100% relative humidity of the fuel gas at standard conditions of 60°F and 14.696 psia (29.92 inches of mercury; 101.325 kPa).
14. Fuel volume flow calculation in metric units is based on 100% relative humidity of the fuel gas at a combustion temperature of 25°C and metering conditions of 0°C and 101.325 kPa (14.696 psia; 29.92 inches of mercury). This is expressed as [25, V(0;101.325)].
15. Engine sound data taken with the microphone at 1 m (3.3 ft) from the side of the engine at the approximate front-to-back centerline. Microphone height was at intake manifold level. Engine sound pressure data may be different at front, back and opposite side locations. Exhaust sound data taken with microphone 1 meter (3.3 ft) away and 1 meter (3.3 ft) to the side of the exhaust outlet.
16. Due to variation between test conditions and final site conditions, such as exhaust configuration and background sound level, sound pressure levels under site conditions may be different than those tabulated above.
17. Cooling system design flow is based on minimum allowable cooling system flow. Cooling system maximum external restriction is defined as the allowable restriction at the minimum cooling system flow.
18. Continuous Power Rating: The highest load and speed that can be applied 24 hours per day, seven days per week, 365 days per year except for normal maintenance at indicated ambient reference conditions and fuel. It is permissible to operate the engine at the indicated overload power, for two hours in every 24 hour period.
19. emPact emission compliance available for entire range of operable fuels; however, fuel system and/or O2 set point may need to be adjusted in order to maintain compliance.
20. In cold ambient temperatures, heating of the engine jacket water, lube oil and combustion air may be required. See Waukesha Technical Data.

SPECIAL REQUIREMENTS